

SH
467
.N44
1990

ALASKA DEPARTMENT OF FISH AND GAME
DIVISION OF SPORT FISH

THE UPPER KENAI PENINSULA SPORT AND PERSONAL USE FISHERIES

A REPORT

to the

ALASKA BOARD OF FISHERIES

Anchorage, Alaska

November 1990

Submitted by:

Dave Nelson, Area Management Biologist

Soldotna, Alaska

Don W. Collinsworth
Commissioner

Norval Netsch
Director

Paul Krasnowski
Regional Supervisor
ARLIS
Alaska Resources
Library & Information Services
Anchorage, Alaska

The Alaska Department of Fish and Game operates all of its public programs and activities free from discrimination on the basis of race, religion, color, national origin, age, sex, or handicap. Because the department receives federal funding, any person who believes he or she has been discriminated against should write to:

O.E.O.
U.S. Department of the Interior
Washington, D.C. 20240

TABLE OF CONTENTS

	<u>Page</u>
LIST OF TABLES.....	vii
LIST OF FIGURES.....	x
INTRODUCTION.....	1
SUMMARY OF UPPER KENAI PENINSULA EMERGENCY ORDERS, 1989.....	8
SUMMARY OF UPPER KENAI PENINSULA EMERGENCY ORDERS, 1990.....	9
WHISKEY GULCH/ANCHOR RIVER AREA MARINE RECREATIONAL FISHERY..	10
Background.....	10
1988 Board Action.....	11
1989 Season.....	11
1990 Season.....	11
Management Considerations.....	11
DEEP CREEK MARINE KING SALMON RECREATIONAL FISHERY.....	15
Background.....	15
1988 Board Action.....	16
1989 Season.....	16
1990 Season.....	16
Management Considerations.....	17
LOWER KENAI PENINSULA KING SALMON RECREATIONAL FISHERY.....	21
Background.....	21
1988 Board Action.....	21
1989 Season.....	22
1990 Season.....	22
Management Considerations.....	23

3 3755 000 80694 3

1990
1991
1992
1993
1994

TABLE OF CONTENTS (Continued)

	<u>Page</u>
KASILOF RIVER KING SALMON RECREATIONAL FISHERY.....	27
Background.....	27
1988 Board Action.....	28
1989 Season.....	28
1990 Season.....	29
Management Considerations.....	30
KENAI RIVER KING SALMON RECREATIONAL FISHERY.....	35
Background.....	35
1988 Board Action.....	37
King Salmon Early Run.....	39
1989 Season.....	39
1990 Season.....	40
King Salmon Late Run.....	42
1989 Season.....	42
1990 Season.....	43
Bait and Angler Efficiency.....	45
Guided and Non-guided Anglers.....	45
Catch and Release.....	46
King Salmon Punchcard.....	46
Management Considerations.....	47
KENAI RIVER SOCKEYE SALMON RECREATIONAL FISHERY.....	63
Background.....	63
1988 Board Action.....	64
1989 Season.....	66

TABLE OF CONTENTS (Continued)

	<u>Page</u>
1990 Season.....	66
Management Considerations.....	67
RUSSIAN RIVER SOCKEYE SALMON RECREATIONAL FISHERY	71
Background.....	71
1988 Board Action.....	73
1989 Season.....	73
1990 Season.....	74
Management Considerations.....	75
KENAI RIVER SOCKEYE SALMON DIP NET FISHERY.....	83
Background.....	83
1988 Board Action.....	84
1989 Season.....	85
1990 Season.....	86
Management Considerations.....	86
KASILOF RIVER PERSONAL USE DIP NET FISHERY.....	90
Background.....	90
1988 Board Action.....	92
1989 Season.....	93
1990 Season.....	94
Management Considerations.....	94
LOWER PENINSULA COHO SALMON RECREATIONAL FISHERY.....	98
Background.....	98
1988 Board Action.....	98
1989 Season.....	99

TABLE OF CONTENTS (Continued)

	<u>Page</u>
1990 Season.....	99
Management Considerations.....	100
KASILOF RIVER/CROOKED CREEK COHO SALMON RECREATIONAL FISHERY.....	108
Background.....	108
1989 Season.....	108
1990 Season.....	108
Management Considerations.....	109
KENAI RIVER COHO SALMON RECREATIONAL FISHERY.....	111
Background.....	111
1988 Board Action.....	112
Coho Salmon Early Run.....	112
1989 Season.....	112
1990 Season.....	112
Coho Salmon Late Run.....	113
1989 Season.....	113
1990 Season.....	113
Management Considerations.....	114
KENAI RIVER RAINBOW TROUT AND DOLLY VARDEN RECREATIONAL FISHERIES.....	118
Background.....	118
1988 Board Action.....	120
1989 Season.....	122
1990 Season.....	123
Management Considerations.....	123

TABLE OF CONTENTS (Continued)

	<u>Page</u>
LOWER PENINSULA DOLLY VARDEN RECREATION FISHERY WITH EMPHASIS ON ANCHOR RIVER.....	128
Background.....	128
1988 Board Action.....	129
1989 Season.....	129
1990 Season.....	130
Management Considerations.....	132
KASILOF RIVER/CROOKED CREEK STEELHEAD TROUT RECREATIONAL FISHERY.....	138
Background.....	138
1989 Season.....	138
1990 Season.....	138
Management Considerations.....	139
LOWER PENINSULA STEELHEAD TROUT RECREATIONAL FISHERY.....	141
Background.....	141
1988 Board Action.....	143
1989 Season.....	144
1990 Season.....	144
Management Considerations.....	145
KENAI PENINSULA RAZOR CLAM RECREATIONAL FISHERY.....	154
Background.....	154
1988 Board Action.....	155
1989 Season.....	155
1990 Season.....	156
Management Considerations.....	157

TABLE OF CONTENTS (Continued)

	<u>Page</u>
SILVER SALMON CREEK COHO SALMON RECREATIONAL FISHERY.....	161
Background.....	161
1988 Board Action.....	163
1989 Season.....	163
1990 Season.....	164
Management Considerations.....	164
CRESCENT LAKE RECREATIONAL FISHERY (WEST SIDE COOK INLET)....	166
Background.....	166
1988 Board Action.....	166
1989 Season.....	166
Management Considerations.....	167
KENAITZE EDUCATIONAL FISHERY.....	169
Background.....	169
1989 Season.....	171
1990 Season.....	173
Management Considerations.....	174

LIST OF TABLES

<u>Table</u>	<u>Page</u>
1. Whiskey Gulch/Anchor River marine recreational harvest and angler participation, as determined by Statewide Harvest Study, 1986-1989.....	13
2. Historical summary of the king salmon sport fishery in marine waters off Deep Creek, 1972-1989.....	19
3. Historical harvest and escapement of king salmon for three southern Kenai Peninsula streams (Anchor River, Deep Creek, and Ninilchik River), 1966-1990.....	25
4. Historical summary of Kasilof River drainage early run king salmon fishery, 1978-1990.....	32
5. Kasilof River drift boat counts determined by random aerial surveys, 1990.....	33
6. Summary of Kenai River king salmon population data, 1984-1990.....	50
7. Historical summary of harvest, angler effort and harvest rate, Kenai River king salmon fishery, 1974-1990.....	51
8. Summary of the number of chinook salmon entering the Kenai River in July and August, 1986-1990.....	52
9. Historical summary of Kenai River guide registration program, 1982-1990.....	53
10. Summary of guided vs. non-guided angler harvest, effort, and success rate, early run Kenai River king salmon fishery, 1981-1990.....	54
11. Summary of guided vs. non-guided angler harvest, effort, and success rate, late run Kenai River king salmon fishery, 1981-1990.....	55
12. Summary of guided vs. non-guided angler harvest, effort, and success rate, early and late run Kenai River king salmon fishery, 1981-1990.....	56
13. Summary of estimated angler effort, king salmon harvest and catch by boat anglers by river section, Kenai River king salmon fishery, 1990.....	57
14. Kenai River sockeye salmon escapements and sport harvest, 1977-1990.....	68

LIST OF TABLES (Continued)

<u>Table</u>	<u>Page</u>
15. Kenai River recreational harvest of sockeye salmon by river section as determined by Statewide Harvest Study, 1981-1989.....	69
16. Historical harvest and escapement of Russian River sockeye salmon, 1963-1990.....	77
17. Historical summary of harvest, angler effort and harvest rate, Russian River sockeye salmon fishery, 1963-1990.....	78
18. Counts of above and below weir spawners and sport harvests of late run sockeye salmon returning to the Russian River, Alaska, 1968-1989.....	79
19. Kenai River sockeye salmon counts, local late run Russian River sockeye salmon return and percent of Kenai River sockeye salmon escapement to enter the Russian River, 1968-1990.....	80
20. Kenai River personal use dip net fishery summary, 1981-1990.....	88
21. Kasilof River personal use dip net fishery summary, 1981-1990.....	96
22. Angler participation and harvest of king, coho, and pink salmon; Dolly Varden, rainbow trout, and steelhead trout, Anchor River, 1977-1989.....	103
23. Angler participation and harvest of king, coho, and pink salmon; Dolly Varden, rainbow trout, and steelhead trout, Ninilchik River, 1977-1989.....	104
24. Angler participation and harvest of king, coho, and pink salmon; Dolly Varden, rainbow trout, and steelhead trout, Deep Creek, 1977-1989.....	105
25. Angler participation and harvest of king, coho, and pink salmon; Dolly Varden, rainbow trout, and steelhead trout, Stariski Creek, 1977-1989.....	106
26. Historical summary of harvest, angler effort and harvest rate, Kenai River coho salmon fishery, 1976-1990.....	116
27. Kenai River Dolly Varden harvest by river section as determined by Statewide Harvest Study, 1984-1989....	125

LIST OF TABLES (Continued)

<u>Table</u>	<u>Page</u>
28. Kenai River rainbow trout, number caught vs. number retained by river section as determined by Statewide Harvest study, 1984-1989.....	126
29. Estimated participation (angler days) and harvest of Dolly Varden char (DV), steelhead trout (SH), and coho salmon (SS) on Anchor River, Stariski Creek, Deep Creek, and Ninilchik River, 1977-1990.....	134
30. Recreational harvest estimates of steelhead trout in four lower Kenai Peninsula streams, 1977-1989.....	148
31. Historical summary of the Anchor River rainbow/ steelhead trout data base, 1954-1989.....	149
32. Rainbow/steelhead trout fisheries data, Anchor River, 1987-1990.....	150
33. Razor clam harvest, participation and success rates on all east side Kenai Peninsula beaches, 1969-1990....	158
34. Distribution, by percent, of east side beach Kenai Peninsula recreational razor clam diggers as determined by aerial survey, 1971-1990.....	159

LIST OF FIGURES

<u>Figure</u>	<u>Page</u>
1. The Kenai Peninsula Management Area includes drainages on the west side of Cook Inlet south of the West Forelands and all of the Kenai Peninsula to include Resurrection Bay.....	5
2. The upper Kenai Peninsula Management Area includes all fresh and saltwater fisheries north of Anchor Point....	6
3. Angler-days of effort in upper Kenai Peninsula sport and personal use fisheries, 1977-1989.....	7
4. The Lower Kenai Peninsula encompassing the Whiskey Gulch marine halibut and king salmon fishery.....	14
5. The Deep Creek marine and Whiskey Gulch/Anchor River marine king salmon fisheries.....	20
6. Lower Kenai Peninsula king salmon fishery occurs on Anchor River, Deep Creek, and Ninilchik River.....	26, 107
7. Kasilof River king salmon fishery.....	34, 110, 140
8. Schematic diagram of the Kenai River drainage.....	58, 117
9. Catch rates with and without bait, Kenai River early run king salmon, 1989.....	59
10. Number of registered sportfishing guides, Kenai River, 1982-1990.....	60
11. Percentage of harvest by anglers using sportfishing guides, Kenai River, early run, 1981-1990.....	61
12. Percentage of harvest by anglers using sportfishing guides, Kenai River, late run, 1981-1990.....	62
13. Schematic diagram of the Kenai River drainage.....	70
14. Location of the Russian River in Upper Cook Inlet, Alaska.....	81
15. The Russian River drainage.....	82
16. The Kenai River sockeye salmon dip net fishery occurs downstream from the Warren Ames Bridge.....	89
17. The Kasilof River personal use sockeye salmon dip net fishery.....	97

LIST OF FIGURES (Continued)

<u>Figure</u>	<u>Page</u>
18. Schematic diagram of the Kenai River rainbow trout study sites: 002, 003, and 004.....	127
19. Anchor River Dolly Varden sport harvest estimates from the Statewide harvest surveys and in-season creel surveys, 1977-1990.....	135
20. Dolly Varden enumerated at the Anchor River weir, 1987-1990.....	136
21. The Anchor River Dolly Varden study area includes the Anchor River, Deep Creek, and Ninilchik River.....	137
22. Lower Kenai Peninsula steelhead trout streams.....	151
23. Historical run timing of coho salmon passing upstream through the Anchor River weir (river mile 1.0), by day.....	152
24. Historical run timing of steelhead trout passing upstream through the Anchor River weir (river mile 1.0), by day.....	154
25. East side Kenai Peninsula razor clam beaches.....	160
26. The Silver Salmon Lake drainage.....	165
27. The Crescent Lake drainage.....	168
28. The Kenaitze educational fishery on the Kenai River....	175



INTRODUCTION

The Kenai Peninsula sport and personal use fishing management area includes the drainages on the west side of Cook Inlet south of the west forelands, all of the Kenai Peninsula including Resurrection Bay, and the saltwater fisheries of Central and Lower Cook Inlet in addition to the outer Gulf coast of the Kenai Peninsula. With the exception of the west side of Cook Inlet and the outer Gulf coast, virtually all major fisheries in this management area may be reached via the State's road system (Figure 1).

For regulatory purposes, the Kenai Peninsula management area is subdivided into Lower and Upper Cook Inlet. Lower Cook Inlet management area encompasses marine waters south of Anchor Point east to Cape Puget, plus all fresh waters of the Kenai Peninsula draining into this area. Upper Cook Inlet management area includes not only the remaining fresh waters of the Kenai Peninsula and the associated marine waters north of Anchor Point, but also marine waters of the west side of Cook Inlet from Kamishak Bay north to the West Foreland and all fresh waters draining to this area (Figure 2). This report to the Board addresses the Upper Cook Inlet management area.

The Upper Cook Inlet area of the Kenai Peninsula offers diverse fishing opportunity to recreational and personal use fishermen. Major fisheries target four species of salmon in both fresh and salt water, razor clams and other shellfish in addition to fisheries for trout and char. Major wild king salmon fisheries occur on the Lower Peninsula streams of the Anchor River, Deep Creek, and Ninilchik River, in the marine waters of Cook Inlet adjacent to Whiskey Gulch and Deep Creek, and in the Kenai River which supports the largest fishery for this species in Alaska. A successful enhanced king salmon fishery occurs at the Kasilof River, approximately 15 miles south of Soldotna; a small wild late run supports an expanding fishery.

Wild coho salmon support major fisheries on the aforementioned Lower Peninsula streams and in the Kenai River which is the largest coho salmon fishery in Alaska. Numerous smaller streams, on both the east and west side of Cook Inlet, support smaller sport fisheries for this species. A fall

personal use gill net fishery also occurs on the east side of Cook Inlet which is supported by late run Kenai River coho salmon stocks. Additional fishing opportunity for this species is provided by stocking landlocked Kenai Peninsula lakes.

Sockeye salmon are generally considered a commercial species which are difficult to catch with conventional sport fishing tackle. This is not true on the Kenai Peninsula. The Russian River supports both an early and a late sockeye salmon return. This is one of the largest fisheries in the State which in 1989 harvested 66,500 sockeye salmon. The Kenai River sockeye salmon fishery is a relatively new fishery which has become of major significance since anglers have begun employing techniques which have proven successful at Russian River. In 1989, the return to the Kenai River was 1.59 million sockeye salmon of which recreational anglers harvested an estimated 277,230. In some years the sport harvest in the Kenai River therefore exceeds the sockeye salmon harvest in Russian River, elevating the Kenai River to Alaska's largest sport fishery for this species.

The Upper Kenai Peninsula also supports two personal use sockeye salmon dip net fisheries which occur on the Kenai and Kasilof Rivers. These fisheries are opened by emergency order predicated on achieving escapement levels specified in Board of Fisheries management plans. In 1989 and 1990 the Kasilof River fishery did not occur; harvest in the Kenai River fishery was estimated at 48,980 in 1989. This fishery did not occur in 1990. A personal use gill net fishery targets Kasilof River stocks. This is a June fishery which occurs in Cook Inlet adjacent to the Kasilof River.

Pink salmon return in large numbers to the central Kenai Peninsula only on even years. The major fishery for this species occurs in the Kenai River on wild stocks. Harvest in the Kenai River pink salmon fishery is increasing on even years because of more liberal bag and possession limits (6 daily) on this river.

Chum salmon do not support a significant fishery in the Kenai Peninsula Management area.

The Kenai Peninsula also supports the State's largest razor clam personal use and sport fisheries. The fishery occurs along a 50 mile area of beach between the Kasilof and Anchor Rivers on the east side of Cook Inlet. Harvest in recent years has ranged from 832,000-1.1 million razor clams annually.

Dolly Varden are found in most freshwater drainages of the Kenai Peninsula. This species supports major fisheries on the Lower Peninsula streams and in the Kenai River. Numerous other streams and lakes support this species, providing additional recreational opportunity at roadside as well as more remote locations.

Rainbow trout occur in numerous lakes and streams. Streams which support major trout fisheries are the Kenai River, Russian River (primarily a catch-and-release fishery by regulation) and the streams and lakes of the Swanson River and Moose River drainages. To provide additional fishing opportunity, approximately 30 Kenai Peninsula lakes are stocked, the majority with rainbow trout. Steelhead trout provide recreational fishing opportunity in Anchor River, Deep Creek, Ninilchik River and Stariski Creek. As stocks are at low levels in these streams, only catch-and-release fishing for this species is permitted. An enhanced return of this species has been established in Crooked Creek.

The diverse recreational opportunity described above, combined with ease of access and close proximity to population centers, attracts large numbers of anglers to the Upper Kenai Peninsula. In 1977 the Statewide Harvest Study estimated effort on the Upper Kenai Peninsula to be 342,650 angler-days (Figure 3). In 1989 this estimate had increased by 98% to 678,300 angler-days, making Upper Kenai Peninsula angler effort about 30% of the total sport fishing effort in Alaska.

In 1989, five emergency orders were issued to manage Upper Kenai Peninsula sport and personal use fisheries. In 1990, as a result of low stock levels in some fisheries and more precise management techniques, nine emergency

orders were issued to refine management strategies in upper Kenai Peninsula fisheries (see following pages for a summary of 1989 and 1990 emergency orders).

Management and research functions for Kenai Peninsula sport and freshwater personal use fisheries are the responsibility of the Soldotna area office. The Sport Fish Division staff stationed here is comprised of one area management biologist and four research project leaders. This permanent staff is assisted by approximately 25 permanent/seasonal technicians and biologists whose employment ranges from 2 to 11 months. The Soldotna biological staff is supported by one permanent and one permanent/seasonal clerical position.

The following text discusses all major Upper Peninsula sport and personal use freshwater fisheries which occurred during the 1989-90 seasons. Each fishery is divided into four sections:

1. The background section places the fishery in historical perspective. If the reader is familiar with the history of the fishery, omitting this section will not compromise an understanding of the sections discussing the 1989-90 seasons or the management issues associated with the fishery.
2. The second section describes action taken by the Board of Fisheries in 1988 relevant to the 1989-90 seasons.
3. The third section pertains to the 1989-90 seasons. Its primary purpose is to present current fishery data relevant to the specific fishery. Where appropriate, the text is supported by tables and graphs which follow the text.
4. "Management Considerations" discusses both biological and social issues related to the management of the respective fishery. In-season management strategies applied to the fishery are also presented.

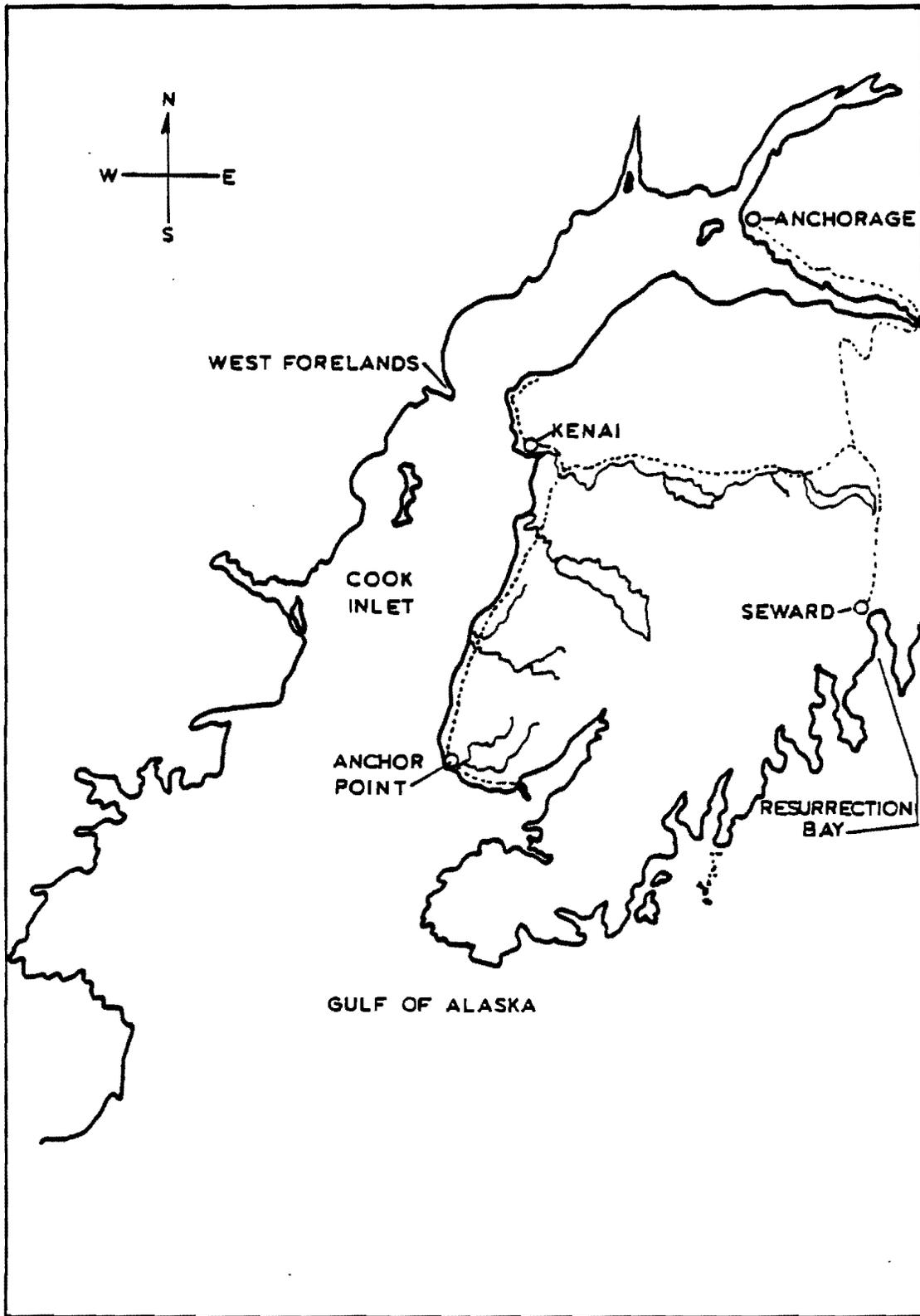


Figure 1. The Kenai Peninsula Management Area includes drainages on the west side of Cook Inlet south of the West Forelands and all of the Kenai Peninsula to include Resurrection Bay.

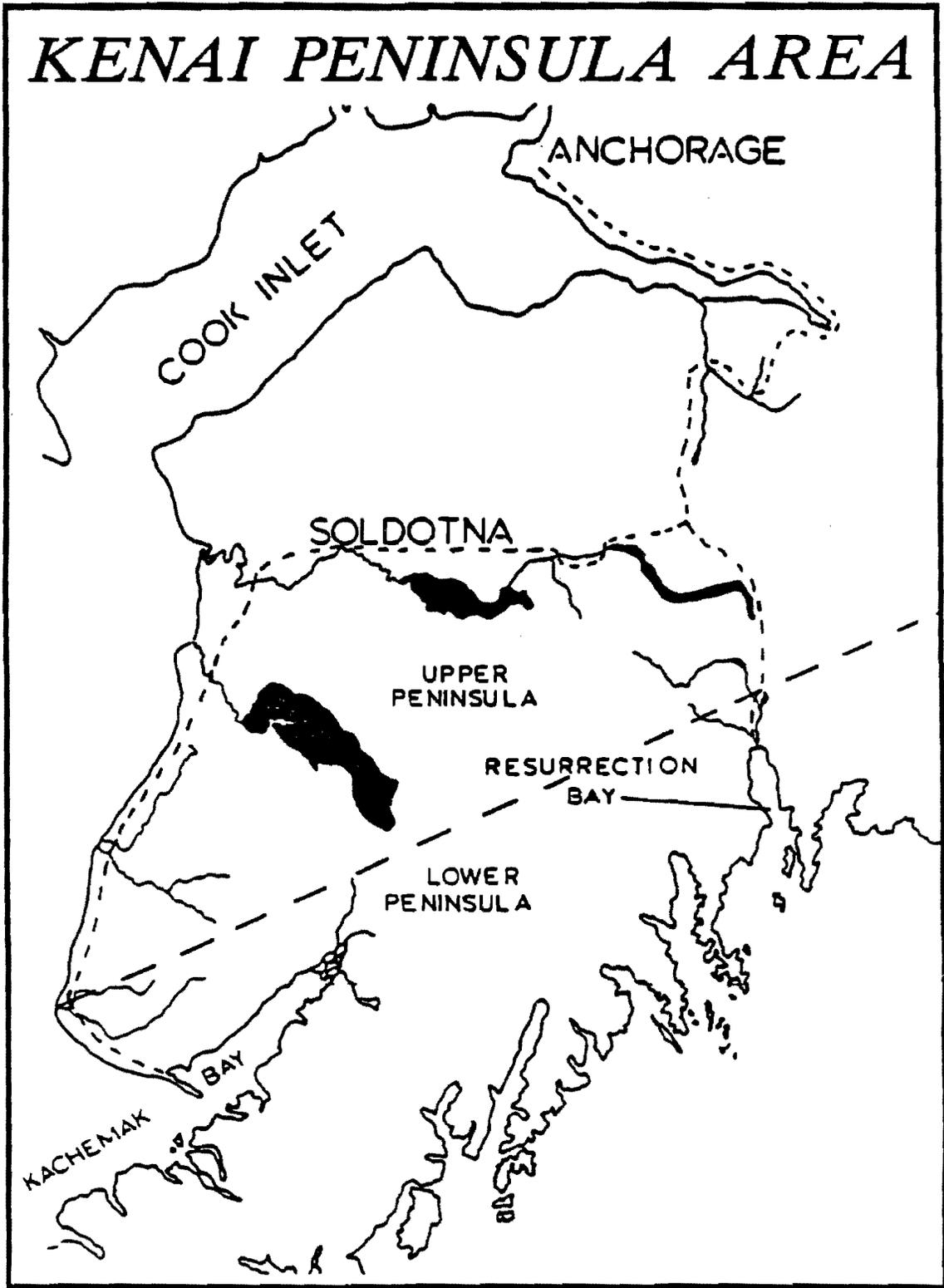


Figure 2. The upper Kenai Peninsula Management Area includes all fresh and saltwater fisheries north of Anchor Point.

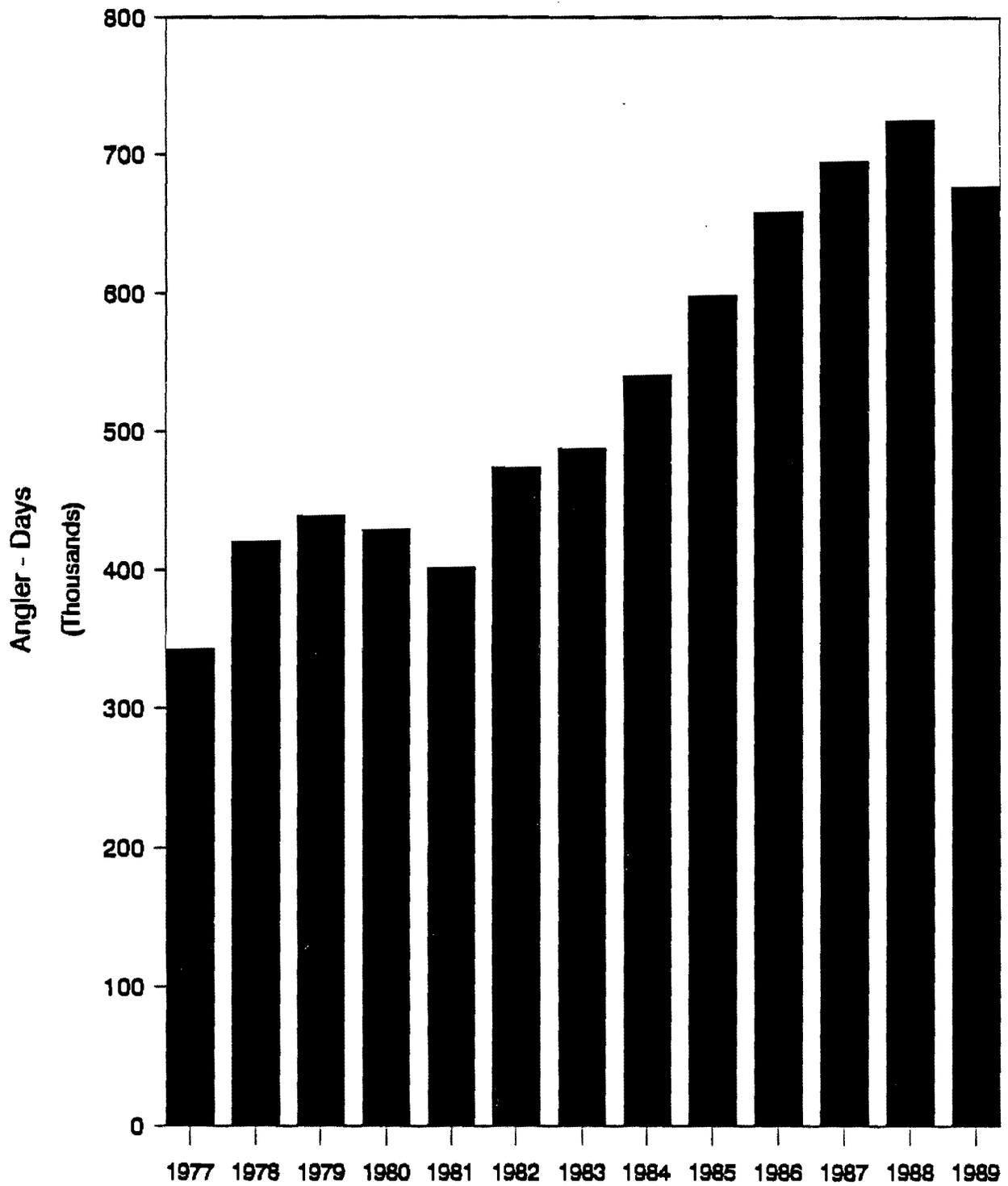


Figure 3. Angler-days of effort in upper Kenai Peninsula sport and personal use fisheries, 1977-1989.

SUMMARY OF UPPER KENAI PENINSULA EMERGENCY ORDERS, 1989

Emergency Order Number	Effective Date	Action/Justification
2-KS-1-04-89	6-20-89 12:01 a.m.	Allowed use of bait in Kenai River. Early run spawning goal is projected to be achieved.
2-RS-1-06-89	7-01-89 12:01 a.m.	Closed Russian River sockeye salmon fishery. Low escapement levels.
2-RS-1-09-89	7-21-89 12:01 a.m.	Opened Kenai River personal use dip net fishery. Surplus sockeye salmon available.
2-RS-1-10-89	7-21-89 12:01 a.m.	Increased sockeye salmon bag limit in Kenai River. Surplus sockeye salmon available.
2-SS-1-16-89	9-2-89	Opened additional area on the Anchor River for coho fishing. Surplus coho salmon available.

SUMMARY OF UPPER KENAI PENINSULA EMERGENCY ORDERS, 1990

Emergency Order Number	Effective Date	Action/Justification
2-RT-1-03-90	6-1-90 12:01 a.m.	Closed lower Russian River to all fishing through June 8. Protection of spawning rainbow trout.
2-KS-1-04-90	6-7-90 12:01 a.m.	Restricted Kenai River king salmon fishery to catch-and-release through June 30. Escapement projected below goal.
2-KS-1-05-90	6-21-90 12:00 noon	Restricted Moose River king salmon fishery to catch-and-release. Low escapement levels in Kenai River drainage.
2-RS-1-08-90	7-2-90 6:00 p.m.	Opened Russian/Kenai River "sanctuary." Early run sockeye salmon escapement projected.
2-KS-1-11-90	7-7-90 12:01 a.m.	Prohibited taking of king salmon in Kenai River upstream from Soldotna Bridge. Additional protection of early run king salmon.
2-KS-1-13-90	7-17-90 12:01 a.m.	Closed Slikok Creek to all fishing through July 31. Additional protection of spawning early run Kenai River king salmon.
2-KS-1-15-90	7-27-90 12:01 a.m.	Prohibited bait in Kenai River king salmon fishery to reduce efficiency. Low escapement projected.
2-KS-1-16-90	7-28-90 12:01 a.m.	Restricted Kenai River king salmon fishery to catch-and-release. Escapement projected below goal.
2-DV-1-22-90	8-8-90 12:01 a.m.	Closed Dolly Varden fishing in Anchor River, Deep Creek and Ninilchik River. Low stock levels.

WHISKEY GULCH/ANCHOR RIVER AREA MARINE RECREATIONAL FISHERY

Background

The area known as the Whiskey Gulch/Anchor River area is the shore line of Cook Inlet located between Stariski Creek to the north and Anchor River to the south (Figure 4). The adjacent marine waters seasonally contain populations of migrating salmon, halibut, and crab in addition to resident populations of razor clams, cockles, and red-neck clams. Since the 1950s when a road was built to provide beach access at Whiskey Gulch, this area has grown in popularity. Initially use was by local residents. In recent years it has also been used by increasing numbers of non-local anglers.

There are no developed launching facilities at either Whiskey Gulch or the mouth of Anchor River. Anglers generally use small boats which can be launched from the beach with a four-wheel drive vehicle. Access at Whiskey Gulch occurs primarily through private property. Both public and private lands are available at the mouth of Anchor River.

In the mid-1980s, staff observation indicated this fishery was receiving increased recreational usage. In 1986 a creel census was therefore conducted at Whiskey Gulch. Because of the difficulty in determining which area (Whiskey Gulch or Anchor River) anglers were utilizing, the census was discontinued after the 1986 season. For data reporting purposes, it has been determined that the most accurate method of ascertaining harvest and effort is to combine Whiskey Gulch and Anchor River as a single fishery. Harvest and angler participation in the fishery are derived from the Statewide Harvest Survey (Table 1).

As does the Deep Creek marine fishery to the north, this fishery targets both king salmon and halibut. The majority of early run king salmon caught here originate in the local streams of Anchor River, Stariski Creek, Deep Creek and Ninilchik River in addition to the Kenai and Kasilof Rivers. Late run king salmon which migrate through this area originate in the Kenai River and to a lesser degree, the Kasilof River. Based on the 1986 creel census, about

20% of the king salmon harvest is comprised of late run fish. The first harvest of early and late run king salmon therefore occurs in this fishery and in the Deep Creek marine fishery.

1988 Board Action

There were no regulatory changes regarding this fishery. Prosecution of the 1989-1990 fishery was identical to 1988. The Kenai River Late (Run) Chinook Salmon Management Plan directs that if the minimum late run spawning escapement (15,500) can not be projected, king salmon recreational fishing in Cook Inlet north of Bluff point will be closed. This would include this fishery. This restriction was not required in 1989 or 1990.

1989 Season

This season's king salmon harvest was estimated at 1,050 fish; the halibut harvest was 17,949. Angler effort was estimated at 19,620 days fished. The king salmon harvest and angler participation are within historic ranges for this fishery. The halibut harvest is the highest recorded exceeding the 1988 estimate by approximately 1,000 fish (Table 1).

1990 Season

Harvest and angler participation information for the 1990 season will not be available from the Statewide Harvest Survey until September, 1991. Staff observation indicates harvest (king salmon; halibut) and angler participation will probably exceed 1989 levels.

Management Considerations

Both early and late run king salmon are harvested in this fishery. As Kenai River king salmon are harvested here, there has been some public concern that this interception fishery is negatively affecting the Kenai River sport fishery. Please refer to the section "Deep Creek Marine King Salmon Fishery" for a discussion of this concern.

Participation in this fishery is expected to increase. Increased usage will be by both guided and non-guided anglers. Increased participation, however, is limited by access. Access at Whiskey Gulch is through private land with all launching of small boats from the beach. Access at Anchor River is via both public and private lands; launching is from an unimproved site at the mouth of the river. As long as access and launching facilities are unimproved, participation increases are not expected to be dramatic.

The Corps of Engineers is presently conducting a Reconnaissance Study to determine the feasibility of constructing a harbor at the mouth of Anchor River. If a harbor is constructed here, this relatively small saltwater fishery will rapidly develop into a major fishery.

Table 1. Whiskey Gulch/Anchor River marine recreational harvest and angler participation, as determined by Statewide Harvest Study, 1986 -1989.

Year	King Salmon	Halibut	Angler-Days
1986	630	13,180	17,380
1987	1,050	12,240	28,920
1988	1,600	16,953	20,991
1989	1,050	17,949	19,620
Mean	1,083	15,081	21,728

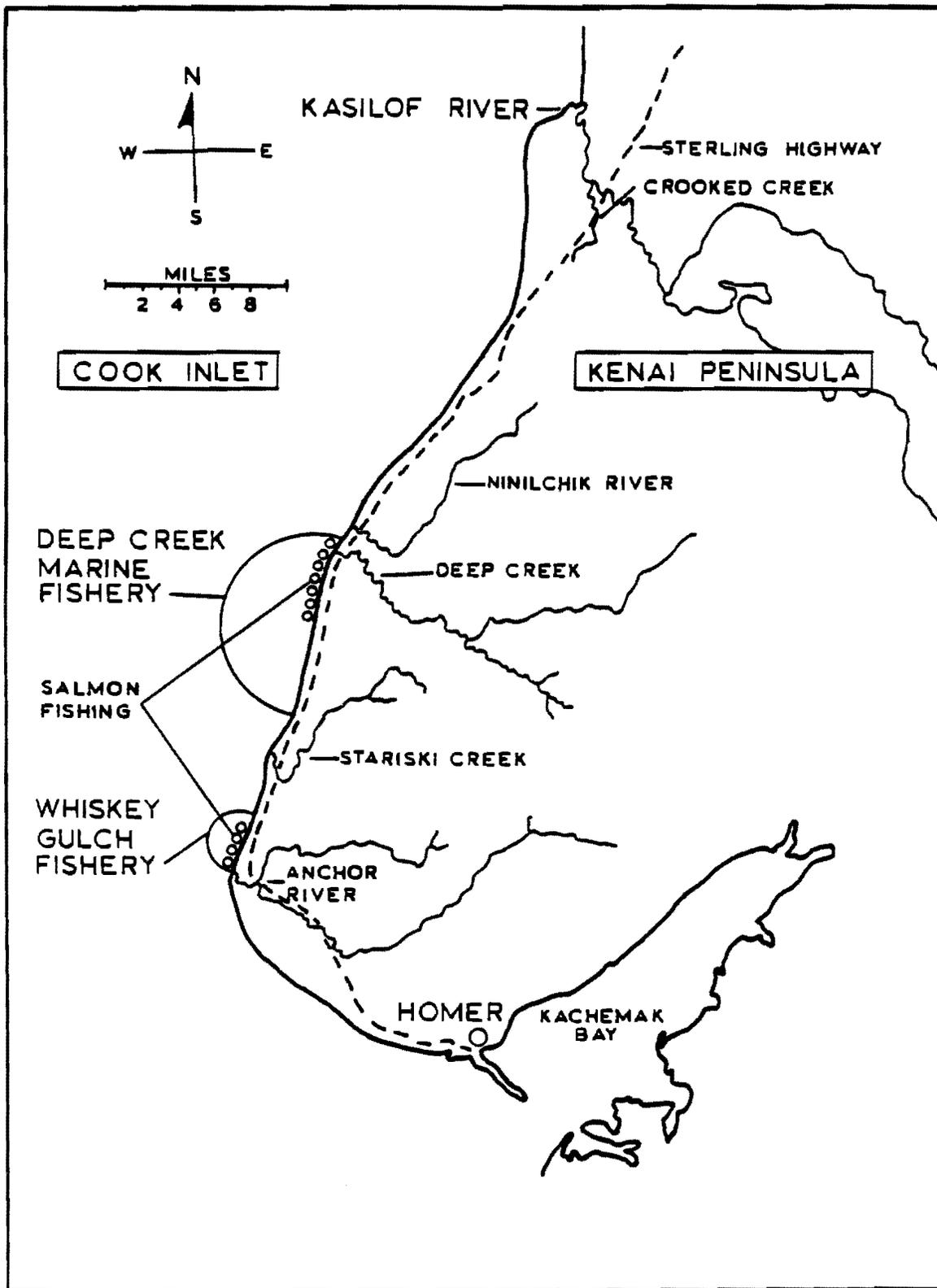


Figure 4. The Lower Kenai Peninsula encompassing the Whiskey Gulch marine halibut and king salmon fishery.

DEEP CREEK MARINE KING SALMON RECREATIONAL FISHERY

Background

The king salmon fishery in the marine waters of Cook Inlet in the vicinity of Deep Creek began in the early 1970s (Figure 5). The Department conducted a creel survey here from 1972-1986.

Harvest in 1987 and subsequent years has been determined by Statewide Harvest Survey. The on-site creel census was terminated because: (1) the king salmon harvest here is relatively small in relation to other king salmon fisheries; (2) it is a mixed stock fishery which virtually precludes any in-season management adjustments; (3) harvests here are a poor indicator of the magnitude of the return to the river of origin and are therefore of limited value in predicting the return and/or success of the major inriver sport fisheries in the Kenai and Kasilof Rivers.

Historically, recreational harvests of king salmon have been more dependent on local weather conditions than the strength of the return. Limited boat launching facilities have restricted the size of vessels that could be used. As a result, inclement weather has, on occasions, restricted fishing to as little as 50% of the available time in which king salmon are present.

King salmon migrate through this area from early May through early August. Early run (May and June) fish originate in Ninilchik River, Deep Creek, Crooked Creek, Kenai River, Kasilof River and on certain years possibly the Susitna River. The majority of late run (July and early August) fish originate in the Kenai River with a very small number of Kasilof River origin.

The recreational fishery here and at Whiskey Gulch/Anchor River is essentially the first harvest of both early and late runs. Only commercial drift fishing is allowed south of Ninilchik and their king salmon catch is minimal. A summary of the historical catch, effort and catch per hour for this fishery is presented in Table 2.

1988 Board Action

There were no regulatory changes affecting this fishery with the exception of a provision in the Kenai River Late Run King Salmon Management Plan. In the event that a minimum spawning escapement in the Kenai River of 15,500 late run king salmon cannot be projected, all fisheries harvesting this stock will be restricted to include saltwater sport fisheries north of Bluff Point. This would include the Deep Creek and Anchor River/Whiskey Gulch Fisheries. Restrictions to these fisheries were not required in 1989 or 1990.

1989 Season

The Statewide Harvest Study estimated a 1989 harvest of 4,306 king salmon. Assuming an historical distribution of harvest, early run harvest was 3,036 (70.5%); late run harvest 1,270 (29.5%). Total harvest is within the historical range (600-6,877) and above the historical mean (3,411).

1990 Season

Observation indicated increased harvest and angler participation in this fishery, especially during the early run. Increased participation is in part a reflection of regulatory restrictions limiting the early run Kenai River king salmon fishery to catch-and-release only effective June 7-30. Many Kenai River anglers who wished to retain a fish directed their efforts here. Increased participation in this fishery is also attributable to an increasing number of Lower Peninsula based guides and increased utilization of the fishery by Kenai River guides on days when the Kenai River is closed to fishing by guided anglers (Mondays in May and June, Sundays and Mondays in July).

Harvest estimates will be available for this season in September 1991. Observation suggests early run harvest will be above 1989 levels. Success rates here during the late run were characterized by most anglers as "below average." Because of the increased July angler participation, late run harvest will probably approximate the historical average of about 1,000 fish.

Management Considerations

The Deep Creek and Whiskey Gulch/Anchor River fisheries harvest both early and late run king salmon stocks. Local early run stocks are at average to above average levels. Early run Kasilof River king salmon are enhanced and at high levels. Early run Kenai River king salmon were below previously documented run strengths in 1989 and 1990. This run supports an intense and conservatively regulated fishery in the Kenai River. As early run Kenai River king salmon are fully utilized in the inriver fishery, there is concern by some members of the public that the more liberal saltwater bag and possession limit of two fish daily coupled with increasing participation is negatively impacting the early run Kenai River fishery.

King salmon destined for streams of Northern Cook Inlet, Kenai River and Kasilof River use the marine waters adjacent to these east side beaches as a migratory corridor. They remain subject to capture in this fishery for a relatively brief period of time. Stocks of local origin stage or hold in these waters for a period of time prior to entering their natal stream and are available to anglers for a greater period of time than Northern Cook Inlet, Kenai and Kasilof River fish. Local stocks therefore contribute a greater percentage to the harvest than is indicated by their relative abundance. It is also probable that a percentage of the abundant early run Susitna drainage king salmon also migrate through this area. Their presence would further reduce the contribution of early run king salmon of Kenai and Kasilof River origin.

Ninilchik River has been enhanced. The first return of adult fish to this local stream will be in 1991. The return is expected to range from 2,000-2,500 fish. The harvest of these fish in the marine sport fishery will also reduce the wild stock contribution of all streams to this fishery.

Late run king salmon harvested in the Whiskey Gulch/Anchor River and Deep Creek marine fishery are primarily of late run Kenai River origin. This stock was also at lower than previously determined levels of abundance in 1989 and 1990. The marine sport harvest of these fish in Lower Peninsula

waters approximates only 1,000-2,000 fish annually (Tables 1 and 2). This was less than 5% of the 1989 and 1990 total returns.

Public concern regarding the interception of early and late run king salmon in the Lower Peninsula marine sport fisheries is therefore more correctly a social than a biological issue. It is concluded that this marine interception fishery has a minimal impact on the Kenai River fisheries at present harvest and participation levels.

Table 2. Historical summary of the king salmon sport fishery in marine waters off Deep Creek, 1972 - 1989.

Year	Early Run			Late Run			Total		
	Harvest	Days Fished	Harvest/ Hour	Harvest	Days Fished	Harvest/ Hour	Harvest	Days Fished	Harvest/ Hour
1972	1,000	2,357	0.119	1,250	1,253	0.272	2,250	3,610	0.173
1973	519	5,245	0.028	491	2,795	0.050	1,010	8,040	0.034
1974	500	3,810	0.037	100	1,280	0.034	600	5,090	0.036
1975	540	3,370	0.061	345	4,680	0.031	885	8,050	0.044
1976	5,495	12,268	0.101	1,382	6,365	0.057	6,877	18,633	0.088
1977	4,617	18,803	0.069	366	6,938	0.017	4,983	25,741	0.056
1978	2,669	14,413	0.059	2,693	9,402	0.081	5,362	23,815	0.068
1979	3,088	13,352	0.053	1,164	8,728	0.034	4,252	22,080	0.046
1980	521	8,065	0.017	747	9,104	0.021	1,268	17,169	0.019
1981	2,363	11,601	0.051	170	3,325	0.018	2,533	14,926	0.042
1982	2,497	14,514	0.056	1,173	9,252	0.033	3,670	23,766	0.046
1983	1,000	21,707	0.011	1,707	10,640	0.045	2,707	32,347	0.021
1984	2,386	14,694	0.040	835	11,895	0.019	3,221	26,589	0.031
1985	5,087	22,118	0.058	1,731	13,422	0.027	6,818	35,540	0.045
1986	3,106	24,393	0.027	676	9,421	0.017	3,782	33,814	0.026
1987	2,605			1,090			3,695		
1988	2,872			1,202			4,074		
Mean	2,404	12,714	0.052	1,007	7,233	0.050	3,411	19,947	0.052
1989	3,036			1,270			4,306		

¹ Data since 1986 from Statewide Harvest Study; days fished and harvest rates not available. Early and late run harvests apportioned as a percentage of total harvest based on historical creel survey data.

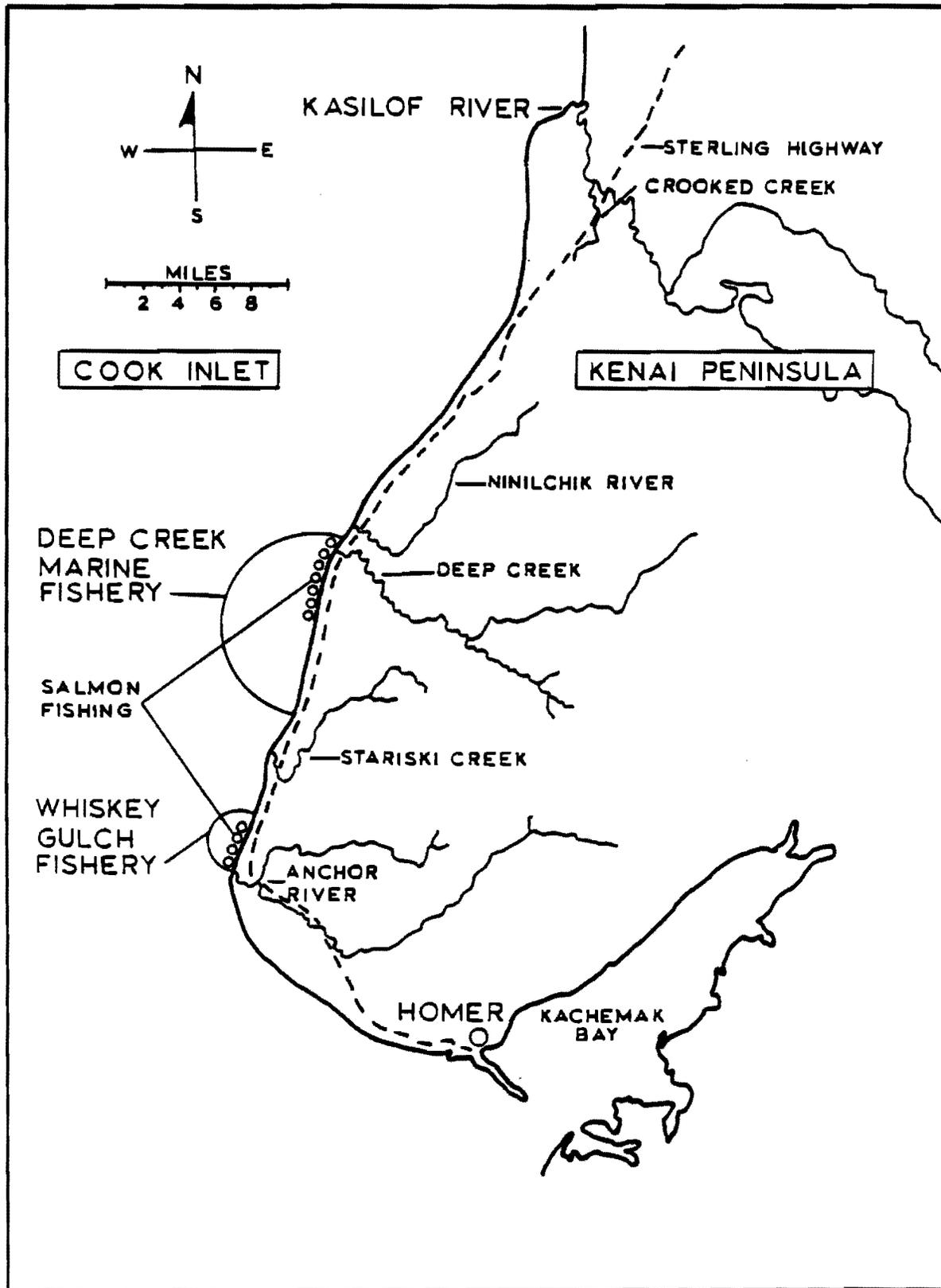


Figure 5. The Deep Creek marine and Whiskey Gulch/Anchor River marine king salmon fisheries.

LOWER KENAI PENINSULA KING SALMON RECREATIONAL FISHERY

Background

Historically, the southern Kenai Peninsula streams of Anchor River, Deep Creek, and Ninilchik River (Figure 6) were the only Peninsula streams which supported a significant king salmon fishery. From the mid-1960s through the late 1970s a punchcard was used to enforce daily and/or seasonal bag limits. From 1981 through 1989 bag limits have been enforced by requiring anglers to record the harvest of each king salmon on the back of their sport fishing license or on a special card if not required to carry a license such as juveniles and senior citizens.

Total harvest from each of these streams is controlled by allowable fishing time and area open to fishing. Anchor River and Deep Creek, from salt water upstream approximately 2 miles, were open to fishing during Memorial Day weekend and, prior to 1989, the next consecutive three weekends (weekends include Monday). Ninilchik River supports a smaller king salmon population than do the two aforementioned streams. The fishery here therefore occurs for only three consecutive 3-day weekends in the lower 2 miles. The fishing season on these streams has been in affect since 1978.

1988 Board Action

King salmon returns to Anchor River and Deep Creek have been above average in recent years. Angler effort on these streams has declined compared to the peak years of participation in the late 1970s. The Board therefore extended the fishery on these streams, adding a fifth consecutive, 3-day weekend beginning in 1989. The season on Ninilchik River was unchanged as the number of king salmon here has not significantly increased. Water conditions on this stream are also generally less turbid than on the aforementioned two streams. Clearer water increases angler efficiency and has resulted in a relatively high exploitation rate. Extension of the season on the Ninilchik River was therefore not justified.

Rainbow/steelhead trout in prior years could be retained if caught during the king salmon fishery. In 1989 retention of rainbow/steelhead trout was prohibited at all times on the Anchor River, Deep Creek, Ninilchik River and Stariski Creek because of low stock levels.

1989 Season

No formal creel census is conducted on this fishery. Harvest is determined from the Statewide Harvest Study. This survey revealed Anchor River harvest was 560; Deep Creek, 750 and Ninilchik River, 520. Harvest in Anchor River and Ninilchik River were below average, harvest in Deep Creek was above the historical mean.

Aerial and ground surveys revealed spawning escapements were also below average in all three streams. Escapement in Anchor River, Deep Creek and Ninilchik River was 1,060, 650, and 400, respectively (Table 3). Although total return to each stream was below average, the 1989 inriver returns were within historical ranges and reflects natural fluctuations in population abundance.

1990 Season

Staff observation indicated that both angler participation and harvest increased in this fishery compared to 1989 harvest and participation. Success rates on Anchor River remained high through the fishery while success rates on Ninilchik River and Deep Creek were characterized as "average" to "above average." Angler participation on all three streams exceeded that of the 1989 fishery. The reason for increased participation here is thought to be related to relatively low king salmon returns to the Kenai River (early run) and Homer Spit Enhancement Lagoon. Below average returns to these fisheries probably prompted anglers to fish the Lower Peninsula streams which offered a greater opportunity to harvest a king salmon.

Aerial surveys indicated spawning escapement to Anchor River was 2,628; Ninilchik River 839; and Deep Creek 1,312. These escapements are above historical averages for these streams (Table 3).

Management Considerations

In the early 1970s the Lower Peninsula king salmon fishery was the major king salmon fishery in Southcentral Alaska. The only other major king salmon fishery of consequence occurred in the marine waters adjacent to Deep Creek. In the late 1970s and early 1980s other king salmon fisheries developed on the Peninsula and in northern Cook Inlet. The Lower Peninsula king salmon fishery is still a major fishery, but these more recently developed king salmon fisheries (Kenai River, Kasilof River, Homer Spit and Susitna drainage streams) are more important in terms of public perception, participation and harvest.

The Lower Peninsula king salmon fishery is, for the most part, self-regulating through time and area restrictions. There has been no in-season restriction for stock conservation for at least 20 years. The fishery has been conservatively managed since the 1960s. The addition of a fifth weekend on Anchor River and Deep Creek beginning in 1989 does not alter that conclusion.

Speaking generally, it may be said that angler harvest and the impact of the harvest on the total population is proportionate to run strength. Average to above average returns result in average to above average harvests and spawning escapements; below average returns result in below average harvests and less than average escapements.

The salient point here is that should a below average return eventuate, the minimal sport harvest will have a minimal impact on the escapement. The escapement would be below average regardless of whether or not in-season regulatory restrictions were imposed.

Ninilchik River was enhanced with king salmon smolt of Ninilchik River origin in 1988 and each year thereafter. The progeny of the 1988 release returned as 1-ocean fish in 1989; 2-ocean fish in 1990. The contribution to the fishery to date of this enhancement has been minimal since few sport fishermen retain either 1 or 2-ocean king salmon in this fishery.

The 1991 return of 1, 2, and 3-ocean fish to Ninilchik River is expected to be significant. Returns of enhanced fish, assuming a 2%-5% smolt to adult survival rate, could approximate 2,000-2,500 additional fish. A return of this magnitude will require a more liberal season. Should in-season evaluation indicate a significant increase in the harvestable surplus, the fishery will be appropriately liberalized by emergency order to ensure the maximum benefit from this enhancement program accrues to recreational anglers.

Table 3. Historical harvest and escapement¹ of king salmon for three southern Kenai Peninsula streams (Anchor River, Deep Creek and Ninilchik River), 1966-1990.²

Year	Anchor River			Deep Creek			Ninilchik River			Total		
	Harvest	Escapement	%Harvest	Harvest	Escapement	%Harvest	Harvest	Escapement	%Harvest	Harvest	Escapement	Run
1966	290	1,330	18	50	540	8	200	870	23	540	2,540	3,080
1967	240	1,200	17	180	270	40	120	360	25	540	1,830	2,370
1968	250	530	32	160	200	44	210	450	32	620	1,180	1,800
1969	80	1,800	4	40	200	17	130	760	15	250	2,760	3,010
1970	170	1,850	8	60	...	...	280	...	...	510	1,850	2,360
1971	60	1,220	5	40	...	...	140	...	...	240	1,220	1,460
1972	180	1,890	9	140	530	21	170	1,360	11	490	3,780	4,270
1973	330	1,660	17	140	220	39	300	640	32	770	2,520	3,290
1974	440	1,000	31	290	740	28	350	510	41	1,080	2,250	3,330
1975	210	1,290	14	100	610	14	540	830	39	850	2,730	3,580
1976	830	3,080	21	220	1,680	12	630	1,180	35	1,680	5,940	7,620
1977	1,080	4,170	21	420	990	30	1,170	1,400	46	2,670	6,560	9,230
1978	2,110	2,410	47	800	1,010	44	1,440	990	59	4,360	4,410	8,770
1979	1,910	2,000	49	700	1,750	29	1,490	1,390	52	4,100	5,140	9,240
1980	600	660	48	180	480	27	720	720	50	1,500	1,860	3,360
1981	1,020	1,230	45	520	920	36	1,370	830	62	2,910	2,980	5,890
1982	650	1,540	30	720	2,670	21	1,080	1,430	43	2,450	5,640	8,090
1983	1,210	1,490	45	990	1,010	50	810	710	53	3,010	3,210	6,220
1984	870	1,170	43	620	380	62	540	600	47	2,030	2,150	4,180
1985	390	1,330	23	170	1,110	13	870	650	57	1,430	3,090	4,520
1986	1000	1,330	43	880	2,430	27	370	790	32	2,250	4,550	6,800
1987	720	4,350	14	580	1,670	26	1,090	600	64	2,390	6,620	9,010
1988	860	2,550	25	650	1,040	38	740	1,080	41	2,250	4,670	6,920
1989	560	1,060	35	750	650	54	520	400	57	1,830	2,110	3,940
Mean	670	1,760	27	390	960	31	640	830	42	1,820 ⁴	3,570 ⁴	5,390 ⁴
1990		2,630			1,310			840			4,780	

¹ Harvest and escapement numbers are rounded to nearest ten.

² Harvest estimates from 1966-1976 are from creel survey; 1977 to present are from Statewide Harvest Study.

³ Escapement counts considered minimal due to high turbid water during escapement surveys.

⁴ Excludes 1970 and 1971 data.

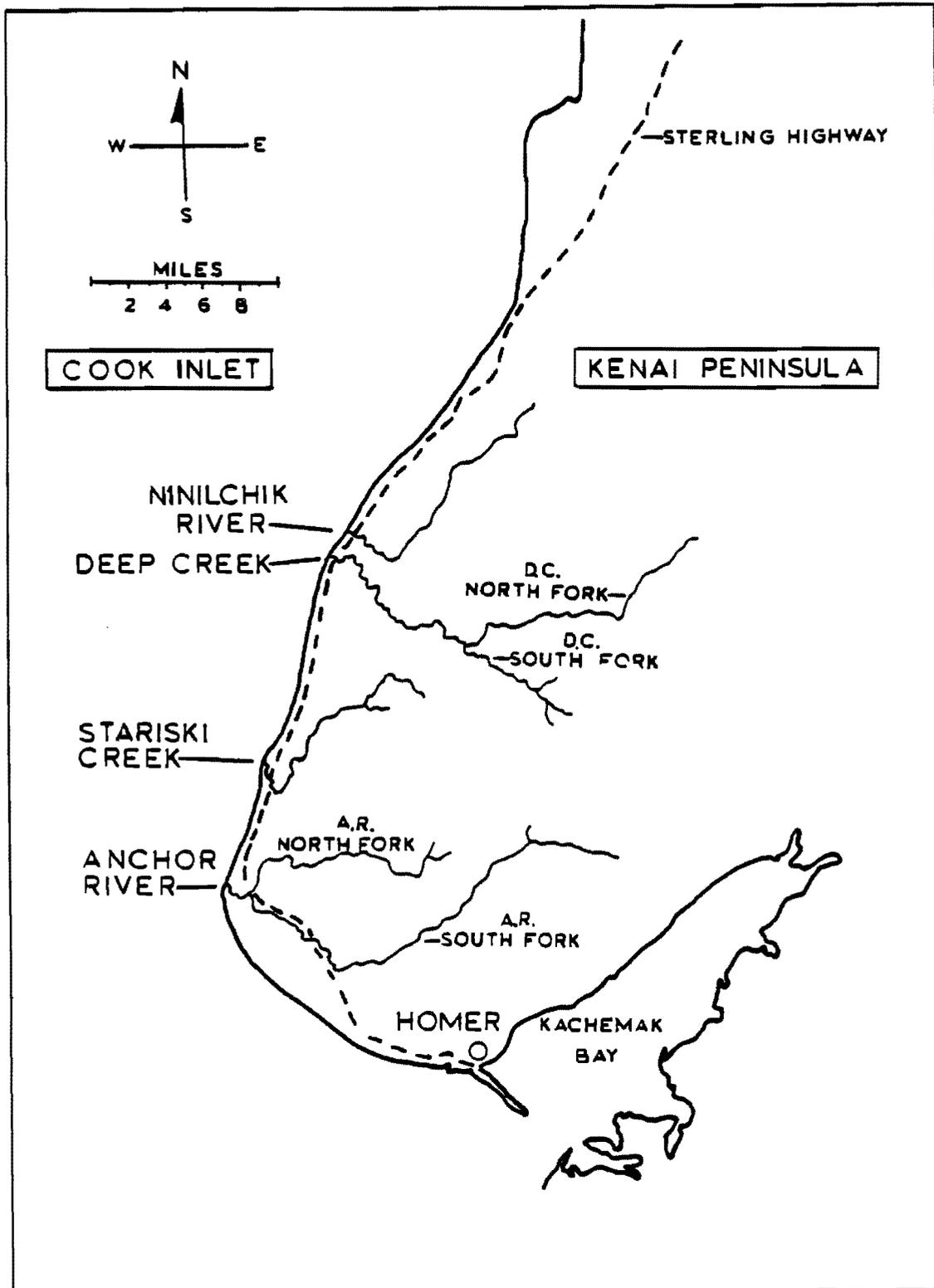


Figure 6. Lower Kenai Peninsula king salmon fishery occurs on Anchor River, Deep Creek, and Ninilchik River.

KASILOF RIVER KING SALMON RECREATIONAL FISHERY

Background

The recreational fishery for king salmon in the Kasilof River occurs from late May through July 31. Prior to 1985, the river was open in its entirety to the taking of king salmon from January 1 through June 30. In 1985, the Board extended the season through July 31 to determine if the late run could support a viable sport fishery. As the Department had limited data regarding this run, the fishery from July 1 through 31 was restricted to the area downstream from the Sterling Highway Bridge. The area upstream from the bridge was closed to king salmon fishing as this was the spawning area of the late run.

The early run is almost all hatchery-reared fish that return to Crooked Creek, a tributary to the Kasilof River, approximately 6 miles upstream from Cook Inlet (Figure 7). In the early years of the fishery virtually all fishing was from the shore of the Kasilof River in the one-half mile immediately downstream from its confluence with Crooked Creek. In recent years an increasing number of drift boats are being employed in the fishery. Timing of the early run is such that there is only a limited harvest by the commercial set gill net fishery on the east side of Cook Inlet. There is, however, a personal use gill net fishery that occurs in late June at the mouth of the Kasilof River. This fishery harvests primarily sockeye salmon returning to Tustumena Lake. Each year small numbers of king salmon of Crooked Creek origin are also caught in this fishery. In 1984, 165 king salmon were reported; 193 in 1985; 168 in 1986; 184 in 1987 and 118 in 1988.

The late run, presumed to be much smaller than the early run, has timing similar to that of the Kenai River late run. The majority of these fish spawn in the mainstem Kasilof River upstream from the Sterling Highway Bridge. A creel census conducted in 1985 on the late run showed little effort on this stock and the total harvest was estimated at less than 200 fish. In 1986 the creel census estimated the late run harvest at 150 king

salmon. Because of the limited harvest and effort directed toward this fishery at that time, this creel census was discontinued.

1988 Board Action

There were no regulatory changes adopted by the Board which affected this fishery. Regulations in 1989-1990 were identical to 1988.

1989 Season

Data from the Statewide Harvest Study estimated a harvest of 3,764 early run king salmon. The harvest rate of .099, determined by a FRED creel survey, equates to one king salmon caught for every 10.1 hours fished which is exceptionally high for a Kenai Peninsula king salmon fishery. The percent of king salmon harvested (55.6%) remained similar to the previous 2 years (Table 4).

In recent years the use of drift boats in this fishery has increased. The largest number of drift boats is found on the Kasilof River on Sundays and Mondays. The Kenai River below Skilak Lake is closed to fishing by guided anglers on Sunday in July and to all king salmon fishing on Monday from May through July which explains the increased effort on the Kasilof River on these days. Harvest by drift boat anglers in 1989 was reported on forms returned by guides; the harvest was 945 fish or about 25.1% of the total harvest. Non-guided boat anglers harvested additional fish.

The spawning escapement to Crooked Creek from 1978-1988 has averaged 2,992 early run king salmon. In 1989 this number was intentionally reduced to 750 with the remaining 1,998 fish to return to the hatchery sold to commercial processors. The number of fish permitted to spawn naturally was reduced because: (1) historical information suggests the annual return to this stream was less than 1,000 fish; (2) large numbers of decomposing carcasses upstream from the hatchery increase the incidence of disease at the hatchery which could jeopardize future king, coho, sockeye and steelhead enhancement programs.

The personal use gill net fishery at the mouth of the Kasilof River harvested an additional 186 king salmon.

1990 Season

Early run king salmon generally enter the fishery at the confluence of Kasilof and Crooked Creek in late May. On June 7, the early run Kenai River king salmon fishery was restricted to catch-and-release fishing only for the remainder of the season for stock conservation. Anglers desiring to retain a king salmon sought alternate fisheries. Observation indicates many displaced Kenai River anglers directed their efforts to the Kasilof River.

The creel survey conducted by FRED samples only shore anglers. Many guided anglers on the Kasilof River employ drift boats. To determine the increase in drift boats on this river, Sport Fish Division staff flew 10 randomly scheduled aerial surveys in June (Table 5). These surveys revealed 7 to 49 drift boats fishing the river per survey, averaging 31 boats per count. Although comparable survey data from prior years are not available, observation suggests the number of drift boats on this river during the early run king salmon fishery increased significantly compared to prior years and that this increase is in large part attributable to restrictions in the Kenai River early run king salmon fishery.

Statewide Harvest Study data for 1990 early run king salmon will not be available until September, 1991. The Crooked Creek natural spawning escapement was limited to 771 fish; an unknown number spawned downstream from the hatchery. The brood stock requirement for the hatchery was 379 king salmon and an additional 1,125 king salmon were sold to processors. The 1990 personal use gill net fishery harvested an additional 129 fish. Total 1990 king salmon return to Crooked Creek is conservatively estimated at 10,063.

Observation indicates the efficiency of drift boat anglers equalled or exceeded shore-based anglers. A survey of drift boat anglers is presently being conducted. When results are available in spring 1991, it is anticipated harvest and total return may increase by 1,500-3,000 fish. If data confirm

this assumption, the 1990 enhanced early run king salmon return to Crooked Creek will be one of the highest recorded.

Management Considerations

There were no biological management issues associated with the 1989-1990 recreational fishery as virtually all stocks harvested are enhanced.

In prior years social issues were related to limited parking, habitat degradation and congestion. The parking issue has been resolved as the state purchased and improved a previously operated private parking lot. Additional improvements (graveled paths and sanitary facilities) were also added. These amenities are administered by the Division of Parks. The addition of these improvements decreased habitat degradation and provided a more aesthetically pleasing experience.

Crowded conditions on the stream will continue to be part of the fishery. King salmon concentrate in the half mile below the confluence of Crooked Creek and Kasilof River. Anglers therefore direct their efforts here as this area offers the highest probability of success.

Interest in the late run king salmon fishery has increased. Observation indicates that anglers targeting this stock are primarily guided anglers employing drift boats. The late run harvest is not known. Predicated on the ratio of sockeye salmon to king salmon caught in the sockeye salmon sonar fish wheel operated by the Commercial Fish Division, this run is comprised of only a few thousand fish. Random aerial surveys (8) in July indicated 2-14 drift boats on the river. Drift boat fishermen after July 20 could be targeting either early run coho salmon or late run king salmon. Angler effort during the late run from drift boats is therefore subjectively estimated to be about one-third the drift boat effort during the early run.

The late run Kenai River king salmon fishery was restricted for stock conservation on July 27. As this was late in the season, this restriction probably did not transfer significant effort to the late run Kasilof River fishery.

However, if the late run Kenai is restricted at an earlier date in future years, effort directed toward the relatively small Kasilof king salmon late run could significantly increase.

Table 4. Historical summary of Kasilof River drainage early run king salmon fishery,¹ 1978 - 1990.

Year	Kasilof River Harvest		Crooked Creek Egg Take	Crooked Creek Escapement	Sold to Processors	Total Run	Catch Per Hour ²
	Number	Percent	Number	Number	Number	Number	
1978	251	5.1	202	4,513		4,966	0.038
1979	283	7.4	181	3,363		3,827	0.040
1980	310	12.0	167	2,115		2,592	0.019
1981	1,242	30.0	49	2,855		4,146	0.061
1982	2,316	39.8	244	3,259		5,819	0.088
1983	2,853	39.9	496	3,809		7,158	0.044
1984	3,964	52.1	437	3,213		7,614	0.062
1985	2,986	51.5	291	2,521		5,798	0.044
1986	7,071	67.0	317	3,161		10,549	0.073
1987	4,461	54.5	324	3,400		8,185	0.071
1988	4,953	56.6	321	700	2,775	8,749	0.086
1989	3,767	55.6	263	750	1,998	6,778	0.099
Mean	2,871	39.3	274	2,805	2,387	6,348	0.060
1990	Data Not Yet Available		379	771	1,125		0.098

¹ One-ocean jacks not included.

² Data obtained from FRED Kasilof River creel survey.

Table 5. Kasilof River drift boat counts determined by random aerial surveys, 1990.

<u>Date</u>	<u>Time</u>	<u>Below Bridge</u>	<u>Above Bridge</u>
08-Jun	08:52	44	0
10-Jun	10:00	39	0
12-Jun	10:00	49	0
12-Jun	13:30	27	0
15-Jun	11:40	35	0
18-Jun	10:30	31	0
19-Jun	08:00	39	0
22-Jun	11:24	31	0
24-Jun	13:00	7	
29-Jun	12:00	11	
05-Jul	16:00	1	
08-Jul	10:30	7	
18-Jul	12:00	6	
19-Jul	07:45	14	
21-Jul	10:00	6	
24-Jul	11:00	2	
31-Jul	10:30	11	0
31-Jul	14:30	10	

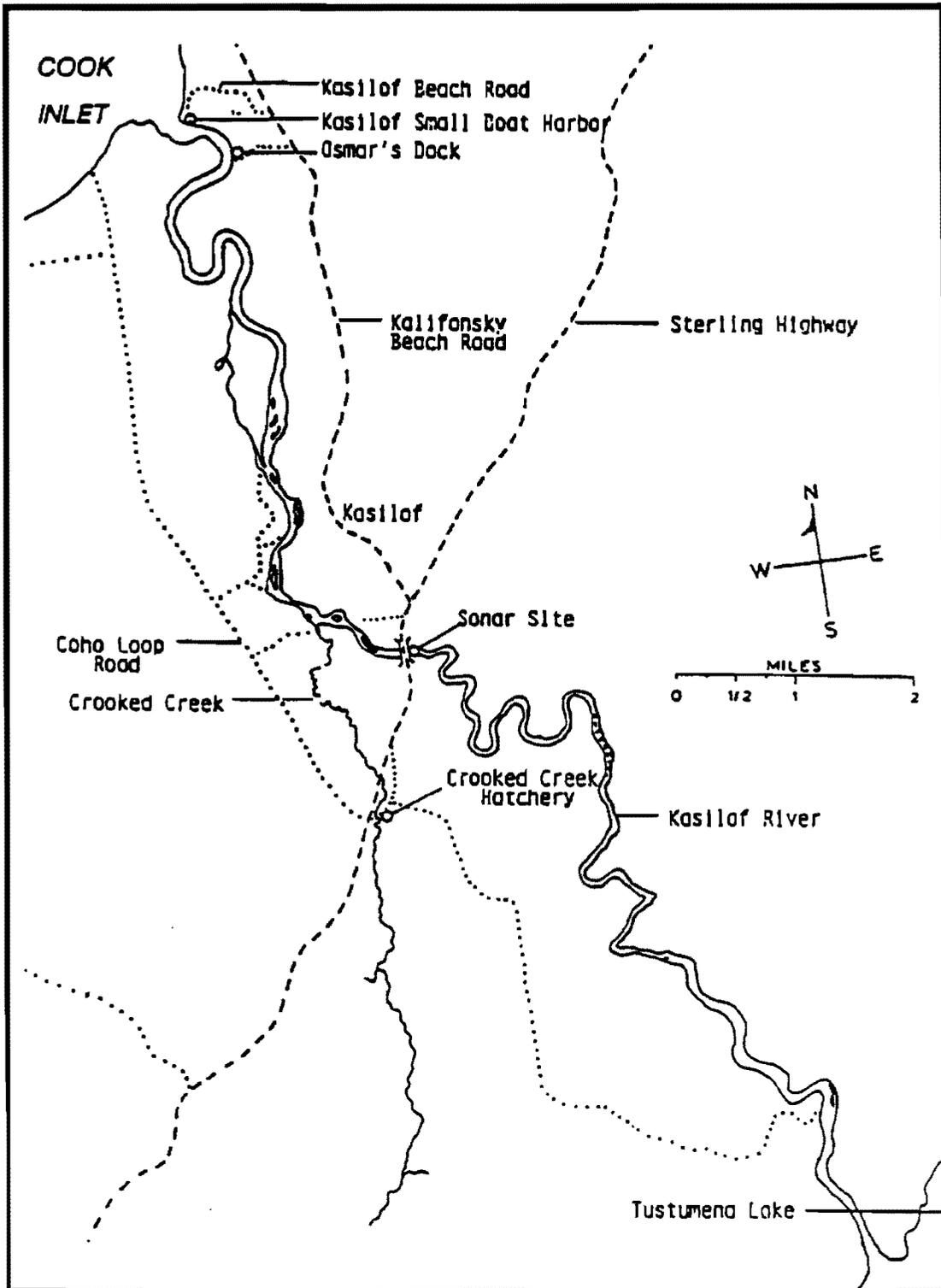


Figure 7. Kasilof River king salmon fishery.

KENAI RIVER KING SALMON RECREATIONAL FISHERY

Background

The Kenai River is the most popular king salmon fishery in Alaska. It is a relatively new fishery which began in the early 1970s. At this time methods were introduced, adopted from the Pacific Northwest, that successfully harvested king salmon from this glacially turbid river. Bouncing bright terminal tackle, either with or without bait, at river velocity was initially the preferred fishing technique. Gradually other methods such as "jet planing" and "back-bouncing" proved quite successful in certain water conditions. However, "drifting" is still the most popular method employed to harvest Kenai River king salmon.

King salmon return to the Kenai River in two distinct runs, early and late. The first run usually begins arriving in harvestable numbers by mid-May, peaks in mid-June, and has passed through the majority of the fishery by late June. Late run fish appear in early July, peak in late July, and are still entering the system in early August. Research indicates most of the early run spawns in two tributaries, the Killey and Funny Rivers. The majority of the late run spawns throughout the mainstem Kenai River from Beaver Creek upstream to Kenai Lake.

Because of its popularity and the magnitude of the king salmon runs which support it, the fishery is restrictively regulated. King salmon fishing is limited to a 50 mile area downstream from Skilak Lake (Figure 8). The season is January 1 through July 31. The daily bag and possession limit is one king salmon 16 inches or greater in length; a seasonal limit of two fish. The majority of the harvest is taken using boats. After retaining a king salmon, an angler is prohibited from fishing from a boat in the Kenai River for the remainder of that day.

The Kenai River king salmon fishery supports a commercial guiding industry. Since 1982 guides have been required to register with the State. In that year 125 businesses registered employing 207 guides. In 1988, 162 businesses

registered which employed 245 guides. Guided anglers are more restrictively regulated than non-guided anglers (1) because their efficiency is three times higher than the non-guided angler, and (2) for social concerns involving allocation of the harvest between guided and non-guided user groups.

The majority of the area open to king salmon fishing is managed as a State Park by the Department of Natural Resources. In 1986 this agency reduced the maximum size of outboard motors used on the river to 50 horsepower. In 1987 the maximum horsepower was further reduced to 35. The reduction to smaller outboards has generally been favorably received by the angling public. There is no evidence to indicate use of smaller motors has reduced angler efficiency.

Under current Board of Fisheries policy, the early run has been allocated almost exclusively to the recreational angler. Late run fish are harvested by both commercial and sport user groups. Division of the late run catch between these user groups has generated appreciable allocative controversy. Commercial interests and the Department maintain that sockeye salmon stocks cannot be adequately harvested by east side beach set net fishermen without an incidental harvest of late run king salmon. Recreational interests contend that since the "incidental" commercial king salmon harvest has in some years been approximately twice the inriver sport catch, that the allocation of this stock is neither fair nor equitable.

The Department's management and research activities directed toward this fishery began in 1974 with the initiation of a creel census to determine angler harvest, effort and success rates. In 1984, a tag and recapture program was initiated to estimate the population of late run king salmon entering the river. In 1985, the program was expanded to include an estimate of early run fish. This tagging project utilizes drift gill nets to capture king salmon in the lower Kenai River. Tagged king salmon are recovered in the sport fishery through the creel census. The tagging program provides in-season catch-per-unit-effort (CPUE) data and a post season estimate of early and late run abundance.

In 1984, the Department implemented an experimental sonar program to enumerate these stocks. The sonar counter utilizes dual beam technology to separate and enumerate less abundant king salmon from the numerically superior sockeye in two ways. First, the gear electronically filters small fish targets (sockeye salmon size fish and smaller) by establishing a threshold of target strength to estimate the abundance of large fish targets. Second, king salmon almost exclusively migrate in the offshore portion of the river, and the near shore areas where most of the sockeye are found are not ensonified. Estimates of abundance were first realized from the sonar counter in 1987; sonar counts have been used for in-season management of the fishery since 1988.

1988 Board Action

The Board of Fisheries met in Anchorage in December 1988 to address regulatory proposals for Cook Inlet finfish. A major regulatory action of the Board was adoption of Management Plans for the early and late Kenai River king salmon stocks. These plans were developed after lengthy discussion and information exchange between the Board, Department, and public. These plans were in effect during the 1989-1990 season.

The Early Run Management Plan is comprised of the following:

1. A minimum (5,300) and optimum (9,000) escapement goal;
2. Specific guidelines which the Department is to take if these goals cannot be projected;
3. An initial prohibition on the use of bait in the fishery. This is intended to reduce angler efficiency.

Management of the late run has been complicated by the allocation conflict between user groups, lack of defined escapement goals, and the absence of defined regulatory actions should a stock conservation issue be identified.

The Kenai River Late Run Chinook Salmon Management Plan developed by the Board addressed these issues.

Salient issues addressed in this plan are:

1. Establishment of a minimum (15,500) and optimum (22,300) escapement goal;
2. Specific regulatory guidelines for the Department to implement if these goals cannot be projected; identification of the user groups affected by the regulatory restrictions.

It is important to note that through adoption of both the Early and Late Run Management Plans the Board recognized the socioeconomic value of the inriver sport fishery. The intent of the Board as outlined in the respective Plans is that every effort be made to allow the sport fishery to continue unless the minimum escapement goal cannot be projected. If the spawning escapement goal is projected to be between the minimum and the optimum, the Board directed the Department through its emergency order authority to restrict time and area and/or methods and means and/or reduce bag limits. The Department therefore has increased management capability regarding this fishery as emergency order authority prior to 1989 was limited to altering only time and area regulations.

Although not stated in the Plan it was the expressed intent of the Board that the late run fishery not be liberalized if the optimum goal were exceeded. The fishery will therefore not be extended beyond July 31 unless the Department is directed to do so by the Board.

Implementation of the Plans is primarily the responsibility of the Sport Fish Division. Implementation requires the Department to project total return, harvest and escapement as the fishery progresses. The Sport Fish Division research staff prepared a model which provided this information during the 1989 and 1990 seasons.

King Salmon Early Run

1989 Season:

In 1989 the creel survey began May 16. The sonar counter was operational May 11. King salmon counts after May 15 were used to manage the fishery since the model used to project run strength utilized data from May 16 through June 30.

Cook Inlet salmon regulations adopted by the Board in 1988 did not become effective until 30 days following their signing by the Lt. Governor. The Lt. Governor did not sign these regulations, including the regulation initially prohibiting bait during the early run king salmon fishery, until May 9. This precluded enforcement of this regulation until it became effective on June 10.

Anglers complied with Board intent regarding the use of bait during the first part of the early run. On or about June 1, the public became generally aware that the regulation prohibiting the use of bait could not be enforced. A brief "status report" was given to the two local radio stations on June 2. This informal news release reviewed the status of the regulation pertaining to the use of bait, noted that it could not be enforced until June 10, and requested anglers voluntarily comply with Board intent. A formal news release containing the same information was issued June 6.

Observation in the fishery indicated few anglers voluntarily continued to use artificial lures during the period June 1-9. Beginning June 10, anglers again complied with the "artificial lure only" regulation.

Early run timing in 1989 approximated the historical entry pattern. Through June 18, 12,809 early run king salmon had been enumerated by sonar. Harvest through that date was 4,490; potential escapement, 8,319. The population model on June 18 was used to project a final total early run return of 17,747. Of this total, escapement would be 10,547; harvest 7,200. The

decision to permit the use of bait in this fishery was made late morning/early afternoon of June 19. An emergency order permitting the use of bait was issued the afternoon of June 19. This emergency order became effective on Tuesday, June 20.

Total early run return to the Kenai River was 17,992. Harvest and spawning escapement were 7,256 and 10,736, respectively. The early run escapement goal was exceeded by 19.2%.

Total return of early run fish from 1985-1988 has ranged from 15,972-27,080. The 1989 return is within this range (Table 6).

Harvest was the lowest since 1984, but above the historical mean early run harvest. In 1989 anglers fished 234,527 hours. This is the second highest effort recorded in this fishery being exceeded only in 1988 (259,901 hours). Average annual HPUE in this fishery was .032 king salmon per hour. Harvest rate in 1989 was .031 (Table 7).

Guided angler HPUE was .052. This is the lowest guided harvest rate recorded in the last 9 years. Non-guided harvest rate was .015. This is one of the lowest harvest rates recorded since 1980. Guided anglers were 3.5 times more efficient than the non-guided angler.

1990 Season:

The creel survey and sonar counter commenced May 16. As in 1989, the fishery opened without the use of bait. Sonar count through May 31 was 1,464, the lowest count recorded by this date. The population model was predicting an inriver return of only 7,765. Sonar counts from June 1-3 did not increase; on June 4 an inriver return of 8,081 was projected. On June 5 an emergency order was issued restricting the fishery to catch-and-release only beginning June 7. This restriction remained in affect through June 30.

Sonar counts through June 30 were 10,679. An estimated 943 king salmon had been harvested prior to the implementation of catch-and-release restrictions

on June 7; potential escapement on July 1 was 9,736. However, radio tracking of king salmon tagged in the catch-and-release mortality study indicated relatively large numbers of early run king salmon had not entered the spawning tributaries of the Funny and Killey Rivers. Creel survey data indicated anglers were targeting these early run fish with significant angling effort occurring upstream from the Sterling Highway bridge in Soldotna. Creel survey data indicated that if the harvest of these fish was not curtailed, the potential spawning escapement of 9,736 present on July 1 would be reduced below the optimum goal (9,000) established by the early run management plan. An emergency order was therefore issued, effective July 7 through 14, prohibiting king salmon fishing from the Sterling Highway bridge in Soldotna upstream to Skilak Lake.

Total early run king salmon return to the river was 10,679. Harvest prior to June 7 was 943; another 792 early run kings were harvested from July 1-6 upstream from the Sterling Highway bridge in Soldotna, with an additional 263 fish estimated to have perished during the period of catch-and-release fishing (8.1% of the fish caught). Early run spawning escapement was therefore 8,681, 3.5% below the optimum spawning escapement.

Total early run return from 1985-1989 has ranged from 15,972-27,080. The 1990 return was therefore the lowest return recorded. Harvest of 1,735 is the lowest recorded since 1978 as is angler effort (123,148 hours). Reduced effort is directly attributable to the extended period when only catch-and-release fishing was permitted. (Average boat count prior to June 7 was 31, declining to 24 when catch-and-release was mandatory.) Average harvest per unit effort was .024, equating to one king salmon harvested for every 41.6 hours fished. The average harvest rate in this fishery is one king salmon for every 31.3 hours fished.

Guided and non-guided harvest rate was 0.038 and 0.010, respectively. The guided angler was 3.8 times more efficient than the non-guided angler.

King Salmon Late Run

1989 Season:

Late run king salmon begin to enter the river July 1 with the migration continuing until mid-August. The king salmon fishery closes by regulation on July 31. In 1989, July 31 was a Monday. Fishing from boats downstream from Skilak Lake is prohibited on Mondays in July. There were some public requests to permit fishing from boats on July 31. However, as boats are a "Methods and Means" of harvest the Department did not have emergency order authority to permit fishing from boats on that date. As most king salmon are caught from boats, the season effectively concluded July 30.

Late run harvest was estimated at 9,127 fish. This is above the historical average (6,838) but below the record harvests of 1988 (17,512) and 1987 (12,327). Angler effort was 329,051 hours. This is the second highest effort in this fishery being surpassed only by the 361,759 hours of effort in 1988. Late run guided HPUE was .054 or one fish harvested for every 18.2 hours fished. Non-guided HPUE was .016 or one fish harvested for every 62.5 hours fished. Guided anglers were 3.4 times more efficient than non-guided anglers.

Through July 27, the population model was projecting a spawning escapement of 28,560. This was significantly greater than the optimum goal, 22,300. Restrictions to the sport fishery were not deemed necessary as the optimum escapement goal was projected to be exceeded.

The sonar counter was removed on August 8. Through August 7, 29,035 late run king salmon were enumerated. Spawning escapement (inriver return minus harvest) was 19,908, 10.7% below the optimum escapement goal (Table 6). The model did not more accurately project the final spawning escapement because of the early run timing of the 1989 return which was outside the run timing parameters used to construct the model.

The commercial drift gill net fishery was not opened in 1989 due to the presence of oil in drift fishing areas. The east side set net fishery opened July 3, closing August 15. Due to a larger than forecasted return (forecast 4.0 million sockeye salmon; actual upper Cook Inlet return, 6.8 million) and the preclusion of the drift fleet from the fishery due to the presence of oil in the middle inlet, the east side Cook Inlet set gill net fishery fished 26 consecutive days (July 3 through August 4).

All king salmon harvested in the Cook Inlet commercial fishery were required to be reported regardless of the final disposition of the harvest. This fishery reported a harvest of 9,918 king salmon, the lowest reported harvest since 1984. The reported personal use harvest was 4 fish (Table 6).

Total 1989 Kenai River late run king salmon return approximated 40,227. Of this total, 25% were harvested commercially, 24% were harvested in the sport fishery with the remaining 51% comprising the spawning escapement. Estimates of total return are available since 1984. This is the smallest total return to date.

1990 Season:

The late run fishery began July 1. The fishery from July 7-14 was confined to the lower river downstream from Soldotna because of the emergency closure upstream from Soldotna which protected early run fish. After July 14, the entire river downstream from Skilak Lake was again open to king salmon fishing.

The fishery was prosecuted in a normal manner through July 26. On this date seasonal spawning escapement was projected at 20,131-21,101. An emergency order was therefore issued, effective July 27, which restricted the fishery to single hook artificial lures. Reducing angler efficiency would reduce harvest and, given an increase in the number of fish entering the river, permit achievement of the escapement goal with minimum disruption to the fishery.

The sonar count on July 26 was a low 659 fish; the season's spawning escapement continued to be projected below the optimum goal. The fishery was therefore restricted to catch-and-release fishing effective Saturday, July 28. This restriction continued through the season's closure on Tuesday, July 31.

Since the river is closed to fishing from boats on Mondays and guided anglers may not fish from boats on Sundays, guided anglers could not retain late run king salmon for 2 days (Saturday, July 28 and Tuesday, July 31) of the 1990 season; non-guided anglers for 3 days (Saturday, July 28; Sunday, July 29; and Tuesday, July 31). Restricting the fishery to catch-and-release on July 28 reduced the season's harvest by approximately 1,200 fish. Average guide boat count immediately prior to implementation of catch-and-release was 118.1; while catch-and-release was mandatory, the count declined to 15.8. Private boat count displayed a similar trend in participation (144.4 and 15.1, respectively).

Historically, 3.5% to 22.8% of the late run enters the river in August, averaging 15.4%. In 1990, 22.4% of the run entered in August. This strong August component permitted achievement of the spawning escapement goal on August 7 (Table 8).

Late run harvest was 6,247 fish. This is below the historical average and the lowest harvest since 1982. Angler effort was 291,966 hours; above the historical mean but below effort levels of the last 3 years. Late run guided harvest rate was 0.038 or one fish harvested for every 26.3 hours fished. Non-guided harvest rate was 0.013 (one fish/76.9 hours fished). Guided harvest rate is the lowest since 1983; non-guided the lowest recorded in the fishery. Guided anglers were 2.9 times more efficient than non-guided anglers.

The reported late run king salmon harvest from the east side Kenai Peninsula commercial set gill net fishery was 4,139, the lowest reported since 1975. The commercial drift gill net fishery reported a harvest of 621, the lowest

since 1984 (there was no drift gill net fishery in 1989). Commercial fishermen reported an additional 91 king salmon retained for personal use. Total 1990 late run king salmon return is estimated at 37,014, the lowest recorded return since complete data sets have been available (1984 to present). Of this total return, commercial fisheries, to include personal use, harvested 13.1%; the sport fishery 16.9% with the remaining 70.0% comprising the spawning escapement.

Bait and Angler Efficiency

During the 1989 early run fishery bait was not utilized from May 16-31. The harvest rate was .021 king salmon per hour. From June 1 through June 10 (bait utilized) the harvest rate increased to .063, then declined to .019 when bait was again prohibited (June 10-19). Harvest rate increased to .030 after June 19 (bait permitted).

Predicated on the 1989 data, it is concluded that the use of bait more than doubles angler efficiency during the early run (Figure 9). The use of bait was prohibited during all of the 1990 early run fishery.

Guided and Non-guided Anglers

Kenai River guides are required to register with the Division of Parks (Table 9). In 1989, 202 businesses registered. These businesses employed 312 guides who registered 326 boats. Guides, businesses and vessels registered to fish the Kenai River in 1989 increased over prior years (Figure 10). Compared to 1988, businesses increased by 40 (24.7%); guides by 67 (27.3%) and vessels by 67 (25.9%).

Comparing 1989 to 1990, businesses registered increased from 202 to 230, fishing guides registered declined by two to 310 and vessels registered increased from 326 to 355. The number of guides has therefore been virtually unchanged the last two seasons; the number of registered boats has increased, presumably because some guides now utilize both drift and outboard powered boats.

The efficiency of guided anglers is minimally three times greater than the efficiency of non-guided anglers (Tables 10, 11, 12; Figures 11, 12). This relative efficiency was unchanged during the 1989-1990 seasons.

Catch and Release

A catch and release fishery has developed on both early and late run Kenai River stocks. From 1985-1989 king salmon retention by anglers increased from 59.1% to 74.1%, respectively. In 1990, retention of early run fish was prohibited most of the season; retention rate in the late run was 72.2% (Table 13). However, angler handling (keeping or releasing) rate increased to about 90% on the early run in 1988 resulting in an initial bait prohibition for subsequent seasons. This regulation effectively reduced angler efficiency and reduced handling in 1989 (55.0%) and 1990 (46.4%).

King Salmon Punchcard

In 1988 the Board adopted a proposal requiring anglers harvesting king salmon from the fresh waters of the Kenai Peninsula and from waters of the Cook Inlet-Resurrection Bay saltwater area north of a line from Cape Douglas to Point Adam to record their harvest on a punchcard. The punchcard replaced the harvest record which in prior years was on the back of the sport fishing license. Because of the time involved for the Department to implement this system, the punchcard was first required during the 1990 season.

The criticism of the harvest record was that upon harvesting the seasonal limit of king salmon, an angler could easily circumvent the regulation by claiming his license containing the harvest record was lost. A duplicate license and blank harvest record could then be purchased for \$2.00.

The punchcard did not prevent this abuse. On utilizing the five tickets on the punchcard, or the two tickets on which Kenai River king salmon were recorded, an angler could claim the card was lost. A vendor was then obligated to issue a new punchcard. There was no cost to the angler for either the original or duplicate card.

The punchcard system was criticized by license vendors. They were not monetarily compensated for this service as they are when issuing game harvest tickets. Large license vendors issued several thousand punchcards in 1990; several vendors issuing over 5,000. Some vendors maintained they had to hire additional staff to administer the punchcard system.

After landing and killing a king salmon, the angler was required to validate the previously used harvest record in ink. Validation of the punchcard was effected by removing the appropriate day and month from the ticket. In the field, there was no advantage afforded enforcement by use of the punchcard as opposed to the harvest record.

A subsample of 27,663 punchcards issued in Anchorage and on the Kenai Peninsula were analyzed to determine angler residency and the percentage of duplicate cards issued. Of the cards examined, 52% were issued to residents; 48% to non-residents. Duplicates issued were only 1.3% of the total. Residents replaced lost cards at twice the rate of non-residents. Many of the cards examined were incomplete; lacking residency and/or other information.

Printing cost of the punchcards was about \$9,000. Distribution and administration added to this cost.

Management Considerations

Adoption of the Early and Late Run King Salmon Management Plans was imperative to the biological management of the 1989 and 1990 fisheries. The plans established escapement goals and identified management strategies to achieve these goals. Formalized identification of objectives and strategies to achieve these objectives removed much of the subjectivity from the management of this fishery.

Regulations governing the Kenai River king salmon fishery are numerous and complex. Many of these regulations are related to allocative and social

rather than biological issues and reflect the Board's desire to provide recreational opportunity for inriver user groups, i.e. both guided and non-guided anglers. The regulations also relate to the division of the late run harvestable surplus between sport and commercial fishermen.

Restrictive regulations regarding the guided angler initially served a dual purpose: (1) they reduced harvest and were a management tool to conserve the resource; (2) the regulation addressed the social issue of competition between guided and non-guided anglers, allocating additional time to the less efficient non-guided angler. These regulations were adopted by the Board prior to the adoption of the Early and Late Run Kenai River King Salmon Management Plans in 1988 and the development of the sonar counter as a management tool in 1987.

The Board will consider a number of proposals to liberalize the Kenai River king salmon fishery. These proposals address the hours and days guided anglers may fish; the days both guided and non-guided anglers may fish and the extension of the late run fishery into August.

The fishery is presently managed on achieving established escapement goals. The sonar counter now permits an in-season determination of whether or not these escapement goals will be achieved. The restrictions which presently apply to guided anglers and the prohibition on Monday fishing for all anglers can therefore no longer be justified by citing biological concerns. Social concerns, however, remain an issue in the orderly development of this fishery. These issues relate to the competition between the guided and non-guided angler for the harvestable surplus and, in some years, the increased probability of in-season restrictions for stock conservation if the fishery is liberalized. These in-season restrictions are disruptive to guided anglers, non-guided anglers and businesses that derive income from this fishery.

The Late Run King Salmon Management Plan directs the sport fishery to bear the burden of conservation if the spawning escapement is projected to be between 15,500 and 22,300. This occurred in 1990 resulting in a restricted

sport fishery from July 27 through 31. Some sport fishermen viewed this as unfair and believed the burden of conservation should be shared between the sport and commercial fishermen at this escapement level. There are several proposals to be considered by the Board which address this allocative issue.

The late run fishery closes by regulation to all anglers on July 31. Approximately 3%-22% of the late run enters the river in August. These fish are not harvested by sport anglers, but continue to be caught by the east side set net fishery which continues through August 15. The Board's verbal instructions to the staff in 1988 were that the sport fishery should not be extended into August even though the escapement goal was achieved or projected to be achieved.

Table 6. Summary of Kenai River king salmon population data, 1984 - 1990.

Year	Deep Creek Marine Harvest	Eastside Set Net Harvest	Drift Gill Net Harvest	Commercial Personal Use	Kenai River Sport Harvest	Escapement	Total Return
<u>Early Run</u>							
1984					4,956		
1985					7,971	8,001	15,972
1986					7,561	19,519	27,080
1987					13,281	12,362	25,643
1988					12,747	8,133	20,880
1989		1			7,256	10,736	17,992
1990		1			1,735	8,656	10,679 ³
<u>Late Run</u>							
1984	835	5,805	448		7,376	31,796	46,260
1985	1,731	17,723	1,891		8,055	21,708	51,108
1986	679	18,507	1,577		9,004	48,559	78,326
1987	1,000	21,379	4,323		12,237	52,787	91,726
1988	1,202	12,838	2,212		17,512	34,496	67,058
1989	1,270	9,918	0 ²	4	9,127	19,908	40,227
1990	1	4,139 ⁴	621 ⁴	91 ⁴	6,247	25,770	37,014 ³

¹ No census conducted.

² No commercial drift net fishery conducted in 1989.

³ Includes mortality attributed to hook and release fishing; 288-early run, 146-late run.

⁴ Preliminary data.

Table 7. Historical summary of harvest, angler effort and harvest rate, Kenai River king salmon fishery, 1974–1990.

Year	Early Run				Late Run			
	Harvest	Days Effort	Hours Effort	Harvest/ Hour	Harvest	Days Effort	Hours Effort	Harvest/ Hour
1974	1,685	11,275	41,098	0.041	3,225	12,335	87,162	0.037
1975	615	15,047	55,909	0.011	2,355	14,943	53,523	0.044
1976	1,554	16,430	64,750	0.024	4,477	28,030	114,795	0.039
1977	2,173	35,479	112,007	0.019	5,148	47,539	135,082	0.038
1978	1,542	19,568	96,624	0.016	5,578	60,636	212,217	0.026
1979	2,661	39,665	139,154	0.019	4,634	58,895	205,887	0.023
1980	1,946	32,365	123,019	0.016	3,608	38,260	154,435	0.023
1981	4,525	28,335	120,881	0.037	5,285	29,906	149,296	0.035
1982	5,466	45,723	166,334	0.033	4,810	43,366	197,775	0.024
1983	6,360	42,716	169,997	0.037	9,174	56,295	248,519	0.037
1984	4,956	50,455	201,821	0.025	7,376	77,462	348,579	0.021
1985	7,971	47,394	184,836	0.043	8,055	73,613	294,453	0.027
1986	7,561	50,608	183,901	0.041	9,004	75,092	244,440	0.037
1987	13,281	52,716	216,816	0.061	12,327	66,403	310,840	0.040
1988	12,747	52,890	259,901	0.049	17,512	85,282	361,759	0.048
1989	7,256	58,218	234,527	0.031	9,127	71,110	329,051	0.028
Mean	5,144	37,430	148,223	0.032	6,981	52,448	215,488	0.033
1990	1,735	28,845	123,149	0.024 ¹	6,247	67,101	291,966	0.022 ¹

¹ Harvest per hour only for periods open to retention of king salmon.

Table 8. Summary of the number of chinook salmon entering the Kenai River in July and August, 1986 – 1990.

Year	Enumeration Method	July		August		Total
		Number	Percent	Number	Percent	
1986	Tag/Rec ¹	47,757	83.0	9,806	17.0	57,563
1987	Sonar	42,657	88.6	5,466	11.4	48,123
1988	Sonar	40,145	77.2	11,863	22.8	52,008
1989	Sonar	27,930	96.5	1,005	3.5	28,935
1990	Sonar	24,949	77.6	7,214	22.4	32,163
Mean		36,688	84.6	7,071	15.4	43,758

¹ Tag and Recovery.

Table 9. Historical summary of Kenai River guide registration program, 1982 - 1990.

Year	1982	1983	1984	1985¹	1986¹	1987¹	1988¹	1989¹	1990¹
Businesses Registered	125	123	115	107	130	145	162	202	230
Guides Registered²	207	198	214	160	187	221	245	312	310
Vessels Registered	179	185	199	171	198	231	259	326	355
Powered Boats				131	138	154	180	225	229
Drift Boats				40	60	77	79	101	126

¹ Data provided by Division of Parks and Outdoor Recreation.

² Fishing guides only.

Table 10. Summary of guided vs non-guided angler harvest, effort, and success rate, early run Kenai River king salmon fishery, 1981 - 1990.

EARLY RUN													
HARVEST									EFFORT				
Year	Guided			Non-Guided			Total		Guided (Hours)		Non-Guided (Hours)		Total (Hours)
	Number	%	HPUE ¹	Number	%	HPUE ¹	Number	HPUE ¹	Number	%	Number	%	Number
1981	2,247	49.7	0.080	2,278	50.3	0.025	4,525	0.037	28,044	23.2	92,837	76.8	120,881
1982	2,464	45.1	0.083	3,002	54.9	0.022	5,466	0.033	29,774	17.9	136,560	82.1	166,334
1983	4,086	64.2	0.084	2,274	35.8	0.019	6,360	0.037	48,789	28.7	121,208	71.3	169,997
1984	2,560	51.7	0.053	2,396	48.3	0.016	4,956	0.025	48,235	23.9	153,586	76.1	201,821
1985	4,780	60.0	0.082	3,191	40.0	0.025	7,971	0.043	58,593	31.7	126,243	68.3	184,836
1986	3,986	52.7	0.081	3,575	47.3	0.027	7,561	0.041	49,033	26.7	134,868	73.3	183,901
1987	6,382	48.1	0.114	6,899	51.9	0.043	13,281	0.061	55,977	25.8	160,839	74.2	216,816
1988	6,956	54.6	0.089	5,791	45.4	0.032	12,747	0.049	78,465	30.2	181,436	69.8	259,901
1989	5,304	73.1	0.052	1,952	26.9	0.015	7,256	0.031	102,245	43.6	132,282	56.4	234,527
Mean	4,307	55.4	0.080	3,484	44.6	0.025	7,791	0.040	55,462	28.0	137,762	72.0	193,224
1990	1,368	78.8	0.038 ²	367	21.2	0.010 ²	1,735	0.024 ²	65,960	53.6	57,189	46.4	123,149

¹ Harvest per hour

² Harvest per hour only for periods open to retention of king salmon.

Table 11. Summary of guided vs non-guided angler harvest, effort, and success rate, late run Kenai River king salmon fishery, 1981 - 1990.

LATE RUN													
	HARVEST								EFFORT				
	Guided			Non-Guided			Total		Guided (Hours)		Non-Guided (Hours)		Total (Hours)
Year	Number	%	HPUE ¹	Number	%	HPUE ¹	Number	HPUE ¹	Number	%	Number	%	Number
1981	2,530	47.9	0.069	2,755	52.1	0.024	5,285	0.035	36,727	24.6	112,569	75.4	149,296
1982	2,397	49.8	0.047	2,413	50.2	0.016	4,810	0.024	50,828	25.7	146,947	74.3	197,775
1983	5,110	55.7	0.100	4,064	44.3	0.021	9,174	0.037	51,195	20.6	197,324	79.4	248,519
1984	2,928	39.7	0.064	4,448	60.3	0.015	7,376	0.021	45,664	13.1	302,915	88.9	348,579
1985	3,045	37.8	0.068	5,010	62.2	0.020	8,055	0.027	45,936	15.6	248,517	84.4	294,453
1986	3,546	39.4	0.067	5,458	60.6	0.028	9,004	0.037	52,843	21.6	191,597	78.4	244,440
1987	5,966	48.4	0.075	6,361	51.6	0.027	12,327	0.040	79,329	25.5	231,511	74.5	310,840
1988	9,409	53.7	0.099	8,103	46.3	0.030	17,512	0.048	95,181	26.3	266,578	73.7	361,759
1989	5,328	58.4	0.054	3,799	41.6	0.016	9,127	0.028	97,866	29.8	231,085	70.2	329,051
Mean	4,473	47.9	0.071	4,712	52.1	0.022	9,186	0.033	61,741	22.5	214,338	77.5	276,079
1990	3,808	61.0	0.038 ²	2,439	39.0	0.013 ²	6,247	0.022 ²	101,223	34.7	190,743	65.3	291,966

¹ Harvest per hour

² Harvest per hour only for periods open to retention of king salmon.

Table 12. Summary of guided vs non-guided angler harvest, effort, and success rate, early and late run Kenal River king salmon fishery, 1981 - 1990.

Year	EARLY AND LATE RUNS												
	HARVEST						EFFORT						
	Guided			Non-Guided			Total		Guided (Hours)		Non-Guided (Hours)		Total (Hours)
	Number	%	HPUE ¹	Number	%	HPUE ¹	Number	HPUE ¹	Number	%	Number	%	Number
1981	4,777	48.7	0.074	5,033	51.3	0.025	9,810	0.036	64,771	24.0	205,406	76.0	270,177
1982	4,861	47.3	0.060	5,415	52.7	0.019	10,276	0.028	80,602	22.1	283,507	77.9	364,109
1983	9,196	59.2	0.092	6,338	40.8	0.020	15,534	0.037	99,984	23.9	318,532	76.1	418,516
1984	5,488	44.5	0.058	6,844	55.5	0.015	12,332	0.022	93,899	17.1	456,501	82.9	550,400
1985	7,825	48.8	0.075	8,201	51.2	0.022	16,026	0.033	104,529	21.8	374,760	78.2	479,289
1986	7,532	45.5	0.074	9,033	54.5	0.028	16,565	0.039	101,876	23.8	326,465	76.2	428,341
1987	12,348	48.2	0.091	13,260	51.8	0.034	25,608	0.049	135,306	25.6	392,350	74.4	527,656
1988	16,365	54.1	0.094	13,894	45.9	0.031	30,259	0.049	173,646	27.9	448,014	72.1	621,660
1989	10,632	64.9	0.053	5,751	35.1	0.016	16,383	0.029	200,211	35.5	363,367	64.5	563,578
Mean	8,780	51.7	0.075	8,197	48.3	0.023	16,977	0.036	117,203	25.0	352,100	75.0	469,303
1990	5,176	64.8	0.038 ²	2,806	35.2	0.012 ²	7,982	0.022 ²	167,183	40.3	247,932	59.7	415,115

¹ Harvest per hour

² Harvest per hour only for periods open to retention of king salmon.

Table 13. Summary of estimated angler effort, king salmon harvest and catch by boat anglers by river section, Kenal River king salmon fishery, 1990.

Run	Downstream Section	Midstream Section	Combined Total	95% Confidence Interval	Upstream Section ¹	Total
<u>EARLY RUN</u>						
Effort	72,799	27,145	99,944	90,665 - 109,223	23,204	123,148
Std. Err. ²	3,040	3,629	4,734			
Harvest	723	616	1,339	796 - 1,882	396	1,735
Std. Err.	167	221	277			
Catch	3,285	1,228	4,513	3,404 - 5,622	460	4,973
Std. Err.	389	411	566			
<u>LATE RUN</u>						
Effort	246,548	22,709	269,257	251,220 - 287,294	22,709	291,966
Std. Err.	8,254	4,070	9,203			
Harvest	5,813	217	6,030	5,158 - 6,902	217	6,247
Std. Err.	432	105	445			
Catch	8,059	289	8,348	7,266 - 9,430	289	8,637
Std. Err.	539	119	552			

¹ Numbers assumed equal to midstream based on observations after 1 July.

² Standard Error

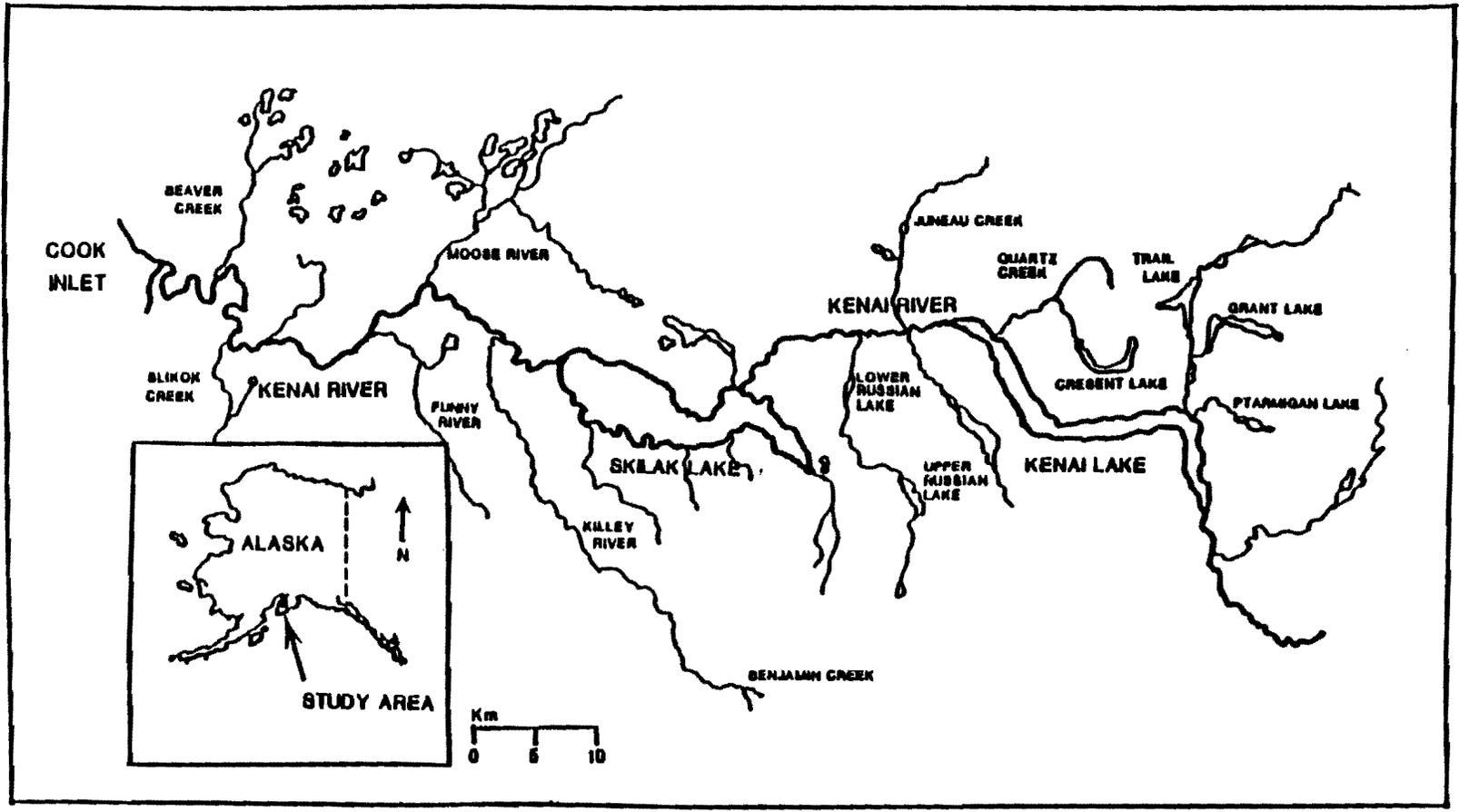


Figure 8. Schematic diagram of the Kenai River Drainage.

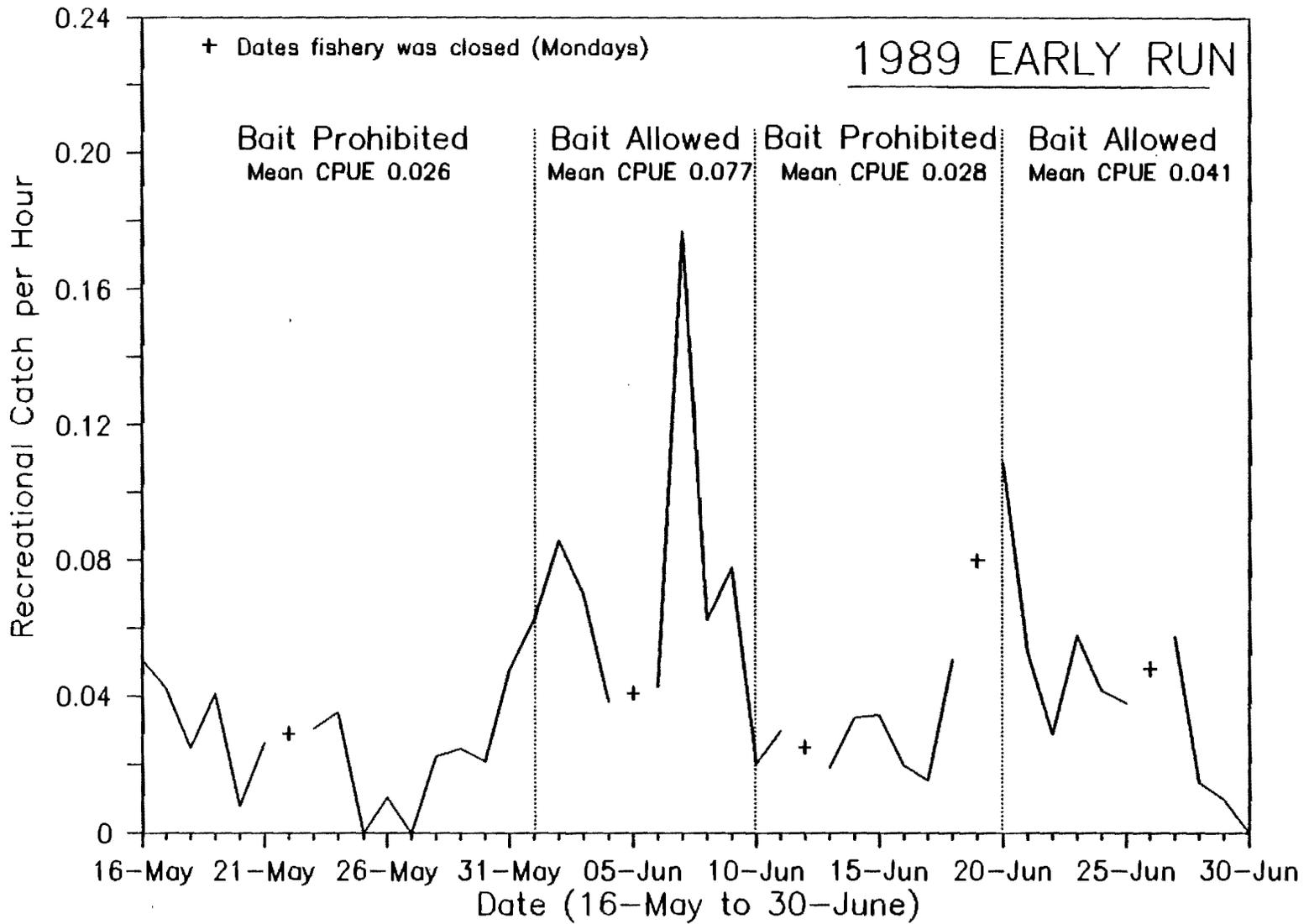


Figure 9. Catch rates with and without bait, Kenai River early run king salmon, 1989.

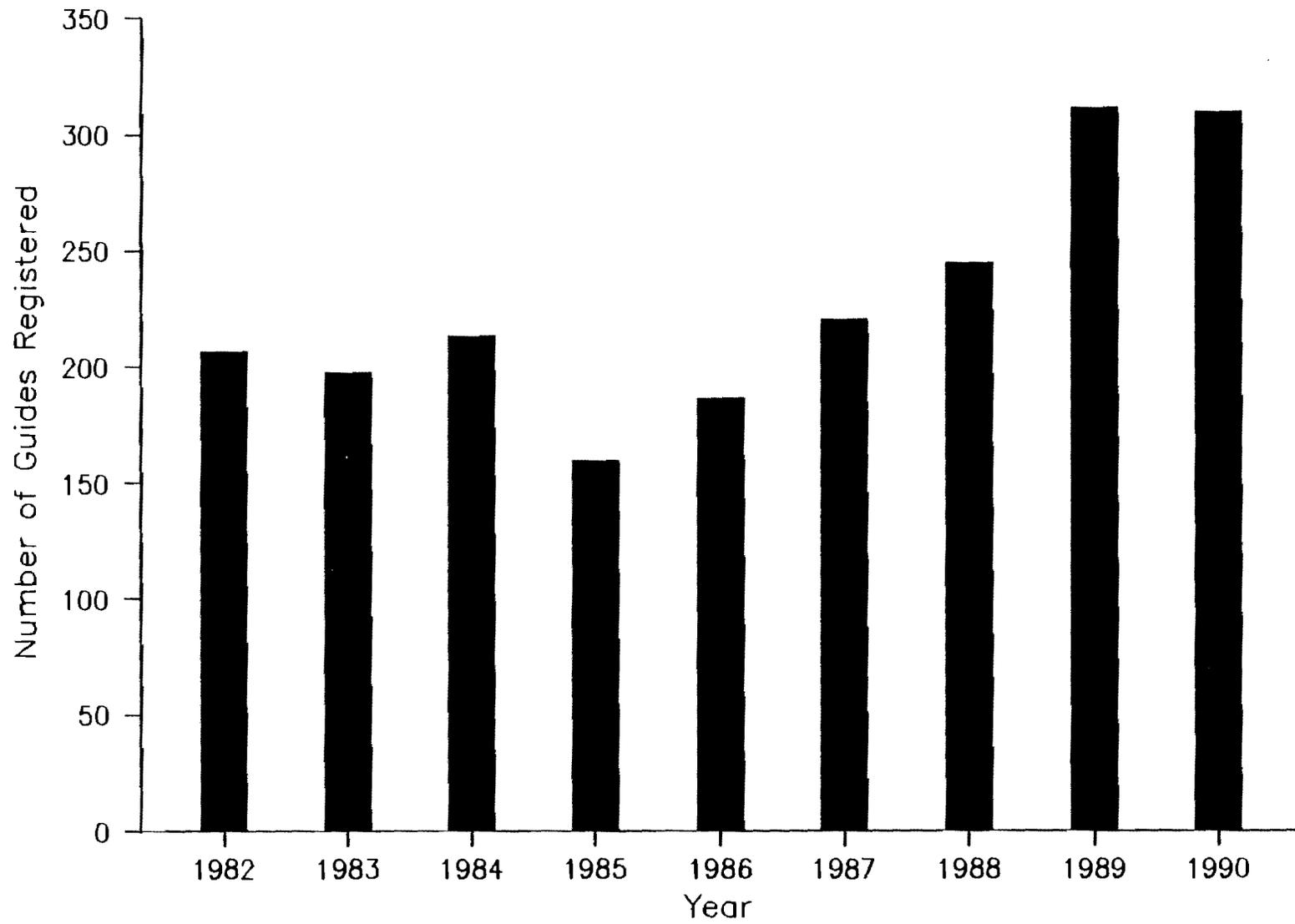


Figure 10. Number of registered sportfishing guides, Kenai River, 1982-1990.

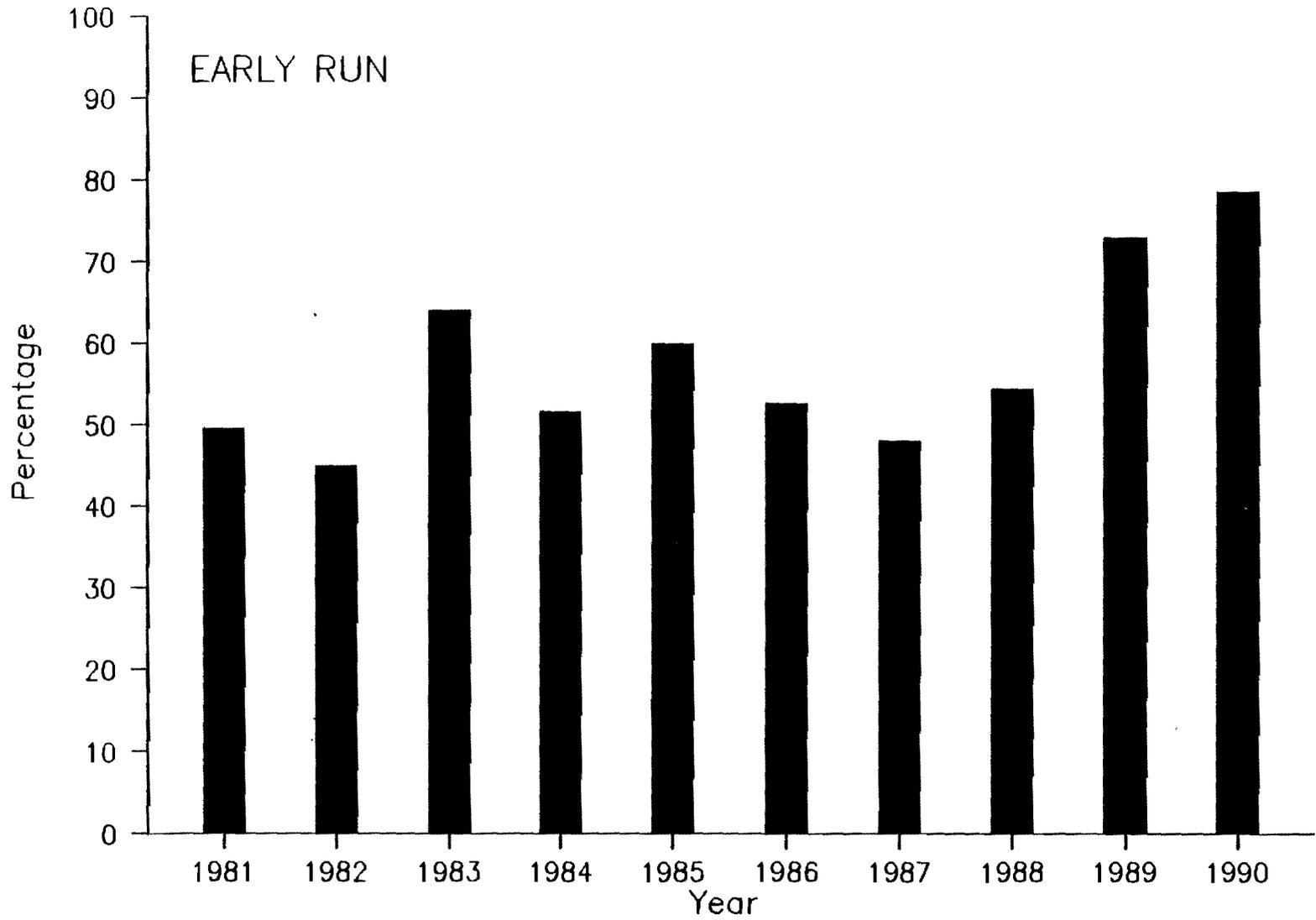


Figure 11. Percentage of harvest by anglers using sportfishing guides, Kenai River, early run, 1981-1990.

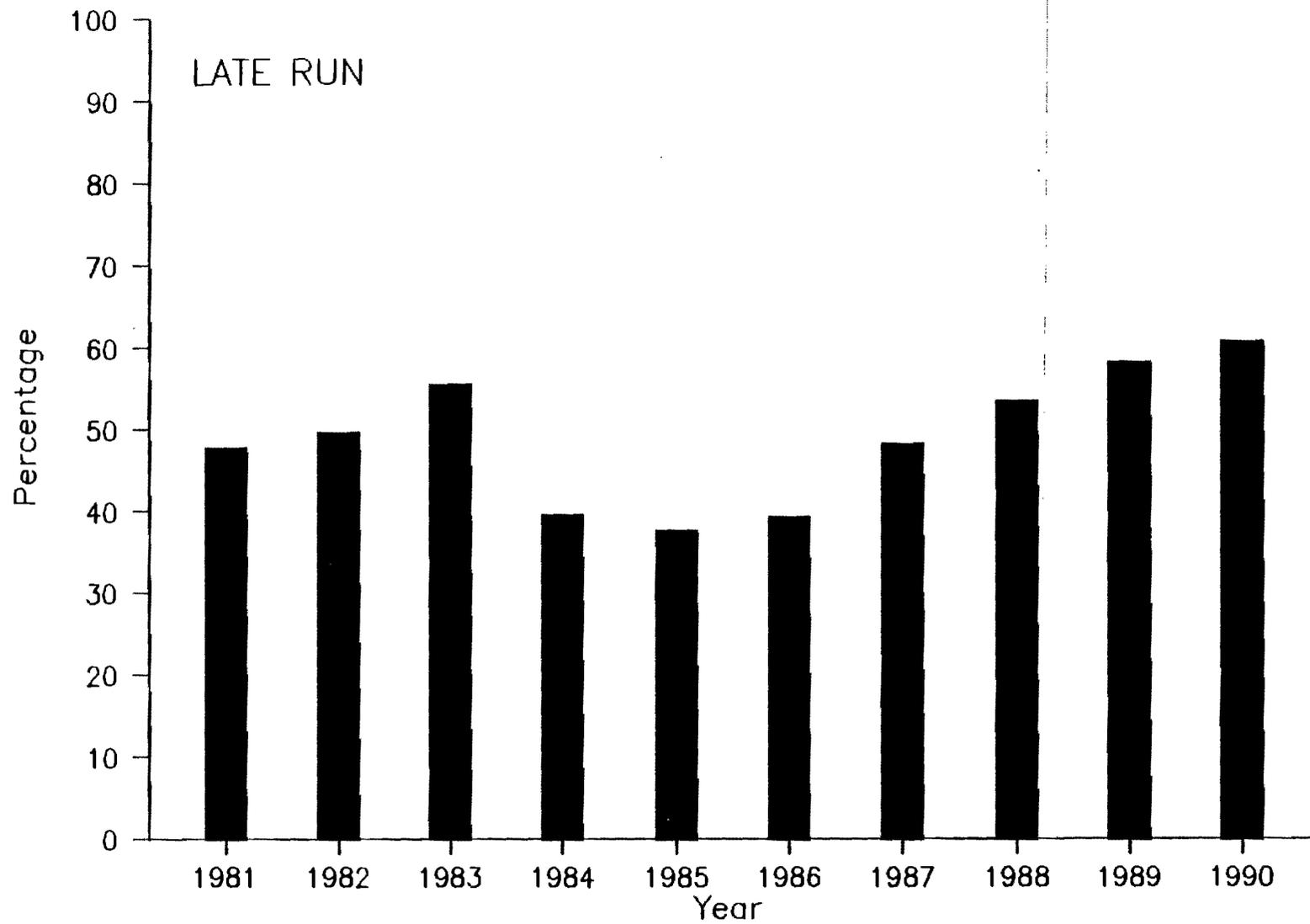


Figure 12. Percentage of harvest by anglers using sportfishing guides, Kenai River, late run, 1981-1990.

KENAI RIVER SOCKEYE SALMON RECREATIONAL FISHERY

Background

The Kenai River originates at Kenai Lake near the community of Cooper Landing and terminates in Cook Inlet adjacent to the city of Kenai. The river is glacial and approximately 82 miles in length. It is paralleled for much of its length by the State's road system and it is therefore the most accessible of Alaska's major salmon producing streams (Figure 13).

Historically, snagging has been the harvest method for taking sockeye (red) salmon in the Kenai River. It was traditionally held that this species would not strike a lure or accept bait and that non-snagging techniques could not be employed to harvest these fish. When the number of anglers was relatively small, snagging posed neither a biological nor a social problem. However, as the population of southcentral Alaska grew and the Kenai River sport fishery increased in popularity, anglers began to oppose the practice as an unethical harvest method. Anti-snagging measures, first pioneered at the Russian River, culminated in 1975 with the Board promulgating Alaska's present freshwater anti-snagging regulation. In 1979 snagging was prohibited in salt water within a 1-mile radius of the Kenai River mouth and in 1984 all snagging in salt water north of Anchor Point was similarly prohibited.

As snagging was no longer a legal harvest method in either fresh or salt water, anglers began to experiment with alternate terminal tackle in an attempt to legally harvest sockeye salmon in the Kenai River. Their initial efforts were moderately successful as the harvest from 1977 through 1981 averaged 23,580 sockeye salmon annually (Table 14).

Between 1982 and 1985 the average harvest increased to 48,600. The dramatic increase is attributed to the use of coho flies as terminal gear with the flies being drifted along the bank similar to the technique used for a number of years at Russian River. The belief that sockeye salmon could not be harvested with conventional tackle was gradually dispelled and this innovative technique prompted additional anglers to seek this species. This,

coupled with relatively clear water in 1982 and 1983, is responsible in part for the increased harvest. The harvest was further influenced by the magnitude of the return in these years which averaged approximately 570,000 fish. A return of only 344,600 reduced the 1984 sport harvest. Thereafter harvests significantly increased with a harvest of 230,760 occurring in 1987 (Table 14).

The fishery is characterized by: (1) requiring large numbers of sockeye salmon to be present for the fishery to be successful; (2) being of short duration, usually from July 16 to August 5 or approximately 20 days; (3) having water clarity affect angler success, i.e. turbid water decreases efficiency and clear water increases catch rates; and (4) the Kenai River being a multi-species fishery in July and August with only a percentage of the total angler effort directed toward sockeye salmon, irrespective of run strength or fishing conditions.

1988 Board Action

The "Upper Cook Inlet Salmon Management Plan" adopted by the Board of Fisheries directs that salmon stocks which move through Upper Cook Inlet from July 1 through August 15 be managed primarily for commercial uses. These dates encompass the migration of late run Kenai River sockeye salmon which support both the Cook Inlet commercial as well as the Kenai and Russian River sport fisheries. Recognizing that these stocks are harvested by two user groups, the Board had previously adopted a management plan with guideline harvest and escapement levels for the Russian and Kenai River sport fisheries. This plan was amended in 1988 and in effect during the 1989-90 season.

The plan, as excerpted from the codified regulations, is:

5 AAC 21.360. KENAI RIVER SOCKEYE SALMON MANAGEMENT PLAN. (b)
The department shall manage the Cook Inlet salmon gill net fishery to attain a total sockeye salmon run of 400,000 to 700,000 into the Kenai River after June 21 to ensure an adequate spawning escapement and provide for a recreational harvest.

(c) The department shall manage the recreational fishery on the Kenai River to ensure adequate spawning escapement as follows:

(1) when the projected Kenai River sockeye salmon escapement is less than 400,000 fish, the department shall close the recreational fishery for sockeye salmon;

(2) when the projected Kenai River sockeye salmon escapement is 400,000 to 700,000 fish, the department shall manage the recreational fishery for sockeye salmon for a guideline harvest of ten percent of the projected escapement; to achieve the guideline harvest level, the department shall establish periods by emergency order during which:

(A) fishing time is reduced; or

(B) bag or possession limits are reduced to one or two fish;

(3) when the projected Kenai River sockeye salmon escapement is greater than 700,000 fish, the department shall open a recreational fishery for sockeye salmon during which the bag and possession limit is six fish.

In adopting this Management Plan the Board recognized the growth as well as the socioeconomic value of this fishery. The allowable harvest was increased from 6% to 10% of the escapement (fish upstream from the sonar counter) and the Department was given authority to regulate bag limits in addition to time and area. As with the Kenai River king salmon fishery, the Board's intent was to provide for a recreational sockeye salmon fishery except in extreme situations where stock conservation was an issue, i.e. less than 400,000 escapement.

1989 Season

On July 19 cumulative escapement was 588,793. It was projected that the maximum escapement goal (700,000) would be exceeded. In conformance with the management plan, the sockeye salmon bag and possession limit was increased by emergency order from three to six effective July 21.

Due to the abbreviated season (about 3 weeks) and the large fishing area available to anglers (about 82 miles) a formal creel census is not conducted on this fishery. Harvest estimates are derived from the Statewide Harvest Study. The 1989 harvest was a record 277,230 sockeye salmon. This harvest is directly attributable to the increased bag limit and record numbers of fish present (Tables 14; 15).

1990 Season

This season's inriver return to the Kenai River as determined by sonar was 659,520. As the maximum goal for the river (700,000) was not exceeded, the daily bag and possession limit remained at three sockeye salmon.

The 1990 preliminary harvest estimate is 58,700 fish above the sonar counter; 23,700 below the counter. Total harvest of 82,400 is above average for this fishery, but below the record harvests of 1987 through 1989. Reason for the reduced harvest level in 1990 is directly attributable to fewer numbers of fish (659,500) being available to the sport angler. The record harvests of 1987-1989 were realized because Kenai River escapements were also at record levels (1.0-1.6 million sockeye salmon). Harvest therefore continues to be a function of the numbers of sockeye salmon available to the recreational angler.

Anglers harvested 8.9% of the fish enumerated by the sonar counter. This is in conformance with the Board Management Plan which directs that the inriver sport harvest shall not exceed 10% of the fish enumerated by sonar counter when the season's escapement is between the minimum (400,000) and maximum (700,000).

It should again be noted that this harvest estimate is preliminary. Final harvest estimate will be derived from the Statewide Harvest Study. Estimates from this Study are expected to be available in September, 1991.

Management Considerations

Management of the 1989 fishery was uneventful. The public was generally supportive of the regulatory change which permitted an increase in the bag limit when the maximum escapement goal was achieved. The 1990 fishery was similarly uneventful. However, there was some angler dissatisfaction as success rates were lower this year than during the three previous seasons.

Table 14. Kenai River sockeye salmon escapements and sport harvest, 1977-1990.

Year	Total Kenai River Effort ² (Angler Days)	Kenai River Escapement	Sport Harvest ¹			Total
			Above Sonar	Percent ³	Below Sonar	
1977	122,140	708,000				23,200
1978	164,260	398,900				33,600
1979	178,480	285,000				16,900
1980	171,800	464,000				24,500
1981	178,720	407,600	14,450	3.5	5,270	19,720
1982	231,950	619,800	38,400	6.2	11,710	50,110
1983	229,230	630,300	48,310	7.7	22,960	71,270
1984	248,790	344,600	11,160	3.2	4,130	15,290
1985	294,610	502,800	40,440	8.0	14,560	55,000
1986	300,320	501,200	47,920	9.6	19,350	67,270
1987	261,510	1,596,900	148,300	9.3	82,460	230,760
1988	338,540	1,021,500	91,770	9.0	46,660	138,430
1989	376,900	1,598,000	165,340	10.3	111,890	277,230
Mean	238,250	698,350	67,340	7.4	35,440	78,710
1990		659,500	(58,700)	(8.9)	(23,700)	(82,400) ⁴

¹ Sport harvest data from Statewide Harvest Study.

² Angler effort directed toward all species. Data from Statewide Harvest Study.

³ Percent of the sockeye salmon enumerated by sonar harvested upstream from the sonar site at river mile 20.4.

⁴ () Preliminary data.

Table 15. Kenai River recreational harvest of sockeye salmon by river section as determined by Statewide Harvest Study, 1981 - 1989.

Year	Cook Inlet to Soldotna Bridge		Soldotna Bridge to Moose River		Moose River to Skilak Lake		Skilak Lake to Kenai Lake	
	Number	Percent	Number	Percent	Number	Percent	Number	Percent
1981	5,270	26.8	5,330	27.1	4,260	21.6	4,840	24.6
1982	11,700	23.4	14,830	29.6	12,140	24.2	11,430	22.8
1983	22,970	32.2	22,460	31.5	15,190	21.3	10,680	15.0
1984	4,420	28.2	2,180	13.9	2,300	14.6	6,800	43.3
1985	14,940	26.1	13,020	22.8	13,300	23.2	15,950	27.9
1986	21,180	29.3	13,850	19.1	13,530	18.7	23,840	32.9
1987	85,020	35.4	65,840	27.4	39,300	16.4	50,030	20.8
1988	49,630	32.5	43,490	28.5	29,180	19.1	30,450	19.9
Mean	26,890	29.2	22,630	25.0	16,150	19.9	19,250	25.9
1989	111,890	40.4	90,550	32.7	45,850	16.5	28,940	10.4

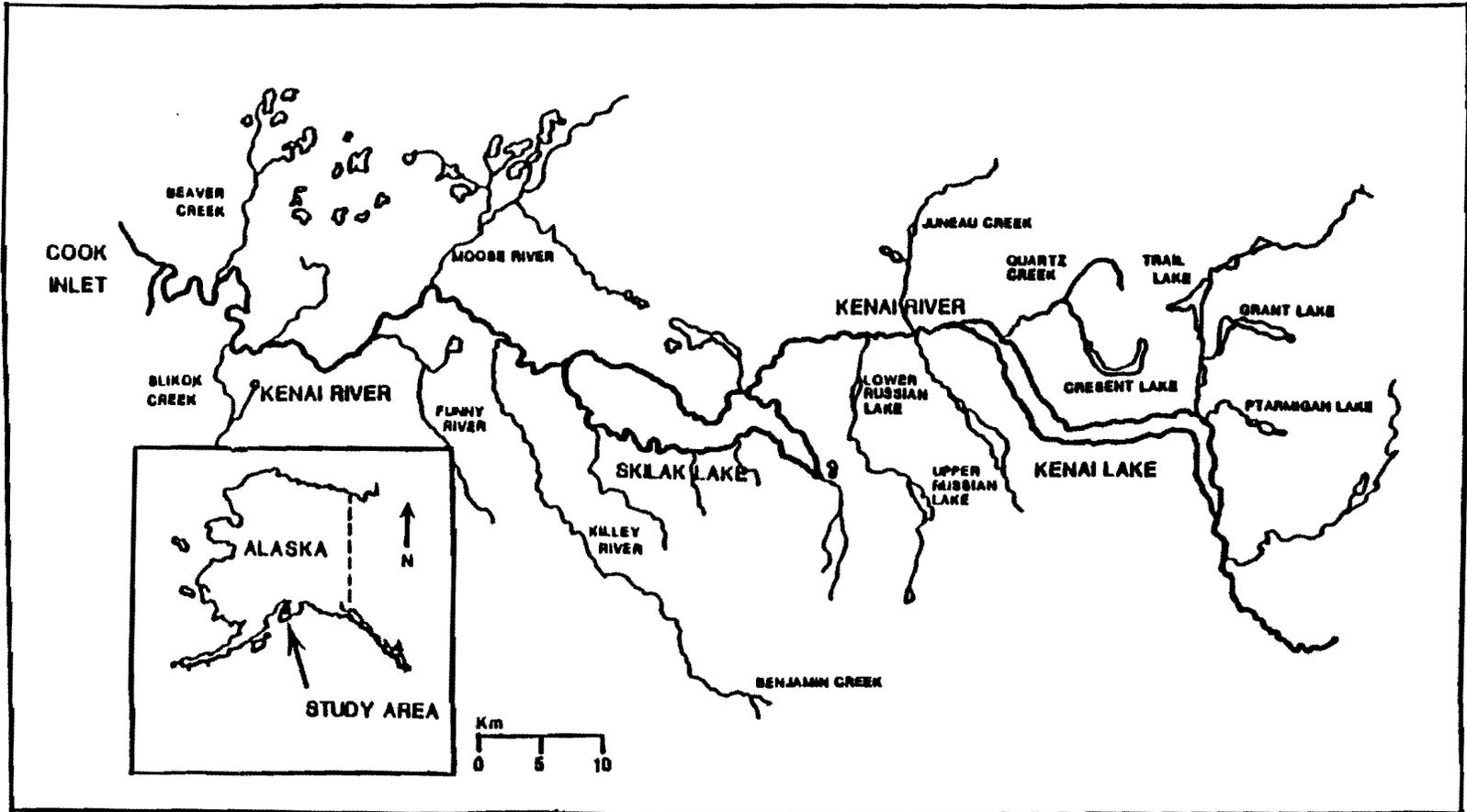


Figure 13. Schematic diagram of the Kenai River drainage.

RUSSIAN RIVER SOCKEYE SALMON RECREATIONAL FISHERY

Background

The Russian River is a clearwater tributary to the Kenai River near the community of Cooper Landing on the Kenai Peninsula approximately 100 miles south of Anchorage (Figure 14). Lands bordering the river are Federally managed, with public access provided at the Kenai National Wildlife Refuge campground at the river's confluence with the Kenai River and at the Chugach National Forest Campground on the Russian River (Figure 15).

The drainage supports one of the largest returns of sockeye salmon to Upper Cook Inlet waters. This return has historically supported one of the largest freshwater sport fisheries for this species in Alaska. In addition, coho and chinook salmon spawn in the system as do resident populations of Dolly Varden and rainbow trout. The drainage is closed to fishing for chinook salmon but supports fisheries for the other species.

Sockeye salmon return to the Russian River during two distinct time periods. An early run arrives at the confluence of the Kenai and Russian Rivers in early June. Because of their run timing, these early run fish are not presently harvested in the Upper Cook Inlet commercial fishery. The primary user group harvesting these fish is therefore the terminal inriver sport fishery. Early run fish typically congregate at the confluence area for about 2 weeks before moving into the Russian River to complete their migration to spawning destinations in the upper reaches of the drainage. A late run, part of the larger late run return of Upper Cook Inlet sockeye salmon, arrives at the confluence area in mid-July and typically migrates directly into the Russian River. This run has two discrete components: one which spawns in the upper reaches of the drainage (above-weir spawners) and one which spawns in the lower river reaches (below weir spawners). The component which spawns in the lower river reaches is more closely related to the mainstem Kenai River sockeye salmon stock than to the above-weir component. Typically, the spawning escapement of the late run exceeds that of the early run (Table 16). For the most part, spawning locations used by the late run

are distinct from locations used by the early run. Because of their run timing, late run sockeye are harvested by a combination of commercial, sport, and personal-use user groups. Allocation and management of the early and late returns are directed by the Russian River Sockeye Salmon Management Plan.

The sport fishery for both early and late run sockeye salmon occurs in the lower 3 miles of the Russian River and in the Kenai River downstream for about 1 mile from its confluence with the Russian River (Figure 15). Both runs support intense sport fisheries. The average early run harvest of nearly 20,000 fish is greater than that of the average late run harvest of about 19,000 fish although the proportional contribution of each run can vary widely among years (Table 16). Angler effort is also typically greater during the early run and averages about 70,000 angler-hours while the late run averages about 76,100 angler-hours (Table 17).

During the early years of the fishery (prior to 1976), average angler participation was 16,400 days fished annually. Since then, participation has increased to an average of about 58,000 days fished each year (Table 17). At times, more than 1,000 anglers simultaneously fish the open 3 mile section of the river. The two public campgrounds managed by the Federal agencies are routinely filled to capacity and are unable to meet public demand for camping and parking.

As angler effort has increased, the regulations governing the sport fishery have by necessity become more restrictive. As early as 1965 the use of treble hooks was prohibited in an effort to reduce snagging. In 1966 terminal gear was limited to flies and the area was designated fly-fishing only. In 1967 the Board of Fisheries required that only fish hooked in the head, mouth, or gills could be retained and, in 1969, this regulation was extended to include all fresh waters of the Kenai Peninsula. In 1973 the regulation was further amended and required that all fish hooked elsewhere of the mouth be released immediately.

Currently, the sport fishery has been restricted to terminal tackle consisting of a single-hook, unweighted fly with a maximum hook gap of 3/8 in. This measure was implemented to reduce angler efficiency and provide a measure of protection to the vulnerable fish as they near spawning destinations. To protect holding fish, a portion of the confluence area (termed the sanctuary), is closed to sport fishing until the early run escapement is projected to be met. The late run's migration through this area is more rapid and this increased protection of a closure is not required. The drainage is closed to salmon fishing upstream of the lower 3 miles to allow fish to migrate unimpeded to spawning destinations.

1988 Board Action

There were no regulatory changes promulgated which affected this fishery. Regulation of the 1989-90 fishery was identical to 1988.

1989 Season

Run timing of both early and late runs was considered "normal". Analysis of available data indicated that the early run escapement goal should be 16,000 fish. The 1989 fishery was managed for this number. In prior years this fishery had been managed to achieve a minimum spawning escapement of 9,000. The minimum spawning escapement goal for the above-weir component of the late run is 30,000. This goal remains unchanged from previous years.

Early run fish arrived at the confluence of the Kenai and Russian Rivers about June 10. Through June 29, cumulative spawning escapement was only 3,064. Observation by staff on that date indicated virtually no early run fish below a counting weir at the outlet of Lower Russian Lake, in the falls below the weir, or in the Russian River. An estimated 6,000 fish were observed holding in the closed sanctuary area. Harvest rate downstream from the ferry crossing on the Kenai River had declined to less than 0.09 fish per hour on this date, indicating that few fish were holding in the mainstem Kenai River below the sanctuary. These data suggested a below average return. The Russian/Kenai River fly-fishing only area was therefore closed

to the taking of sockeye salmon on July 1. As a result of this closure, early run escapement was achieved (15,340). Early run harvest was estimated at 11,290 fish.

The fishery was reopened on July 16 to harvest late run fish. Harvest through the close of the season (August 20) was estimated to be 55,210. This was the second largest harvest on record, exceeded by only the record harvest of 58,410 in 1985 (Table 16). Above and below weir spawning escapements were estimated to be 138,320 and 28,480, respectively (Table 16). The total estimated local return (harvest plus above and below weir escapement) of 222,000 fish was the largest on record (Table 18) and accounted for about 14% of the total estimated Kenai River sockeye salmon return (Table 19).

1990 Season

Early run sockeye salmon again arrived at the confluence of the Kenai and Russian Rivers about June 10. The run and fishery progressed in a normal manner. The spawning escapement goal of 16,000 was projected the morning of July 2 and an emergency order, effective 6:00 p.m. July 2, was issued opening the 700 yard sanctuary area to fishing. Opening this area increased angler opportunity, harvest, and success.

The early run concluded July 15. Spawning escapement and harvest of early run fish were estimated to be 25,739 and 24,310, respectively. The 1990 spawning escapement is above the historical mean escapement (20,000, Table 16) and established goal of 16,000. Harvest was also above the historical average of 21,600 (Table 16). Angler success rate of one sockeye salmon harvested per 5.9 hours of fishing approximated the historical early run success rate (Table 17).

Late run sockeye salmon entered the fishery in harvestable numbers by July 20. Harvest through the regulatory close of the season on August 20 was 52,980. This was one of the highest late run harvests, exceeded only in 1985 and 1989 (Table 16). The above weir spawning escapement of 82,107 was also one of the highest recorded whereas the below weir escapement was below

average (Table 16). The estimated total local return was also above average (Table 18) and represented about 22% of the estimated total return of sockeye salmon to the Kenai River (Table 19). Anglers enjoyed a catch rate of one fish per 2.9 angling hours fished, a rate which was above the historical rate of one fish per 4.1 hours fished (Table 17).

Management Considerations

This fishery is managed on escapement counted at a weir located at the outlet of Lower Russian Lake. In years of low abundance, the escapement is achieved through in-season regulation of the sport fishery. Because of the intensity of the sport fishery, in-season management is usually a total closure until the spawning escapement is projected to be achieved.

Run strength is ascertained by examining three indicators. Weir counts are the primary indicator. Historical data provides the percentage of the run which can be expected to be counted by a given date. A determination of run strength can generally be made a few days prior to the mid points of the early (July 4) and late (August 4) runs.

In some years, fish have been late or have held in the Kenai River. Weir counts must therefore be evaluated in relation to harvest rates (HPUE) in the sport fishery. Harvest rates of below 0.10 fish per hour subjectively indicate few fish in the Kenai River, 0.1 to 0.2 suggest moderate numbers, and harvest rates exceeding 0.20 fish per hour are usually indicative of large numbers of fish in the Kenai River.

Weir counts and harvest rate data are supplemented by on site enumeration of the numbers of fish present in the sanctuary area, lower Russian River, the falls area, and the area between the falls and the weir. Evaluation of data and observations then permit a determination as to whether or not the escapement goal can be achieved without in-season restrictions to the sport fishery.

With the exception of the early run closure, the 1989 fishery was prosecuted in a normal manner. Public acceptance of the early run closure is best termed positive. However, some local businesses in the Cooper Landing area objected to the timing of the closure (just prior to the 4th of July) and the lack of prior notice regarding the status of the fishery. Notice of the fishery's status was provided to the news media prior to the closure by the Sport Fish Division. Contact with Cooper Landing businesses has been increased in a continuing effort to keep them apprised regarding the status of the Russian River sockeye salmon fishery.

The 1989 late run and 1990 early and late runs fisheries were prosecuted in a normal manner. Public satisfaction with these fisheries was high as run strength and harvest were above average.

The early run Russian River spawning escapement goal of 9,000 was established by the Department in the early 1970s as a minimum goal. This was incorporated by the Board into the Russian River Sockeye Salmon Management Plan in 1978. The minimum spawning escapement goal was predicted based on the maximum availability of spawning habitat in Upper Russian Creek, the only known area of early run spawning at the time. At the time this was the best methodology available for determining the escapement goal as insufficient stock productivity data were available.

The minimum goal was determined 19 years ago. Three cycles (these are primarily 6 year old fish) of production data have therefore become available to develop spawner/recruit relationships. Analyses of these data indicates that the desired escapement goal was too low and should be raised to 16,000. Development of this goal is presented as a separate report to the Board.

Table 16. Historical harvest and escapement of Russian River sockeye salmon, 1963-1990.

Year	EARLY-RUN		LATE-RUN		
	Sport Harvest	Spawning Escapement	Sport Harvest ¹	Spawning Escapement	
				Above Weir	Below Weir
1963	3,670	14,380	1,390	51,120	Unknown
1964	3,550	12,700	2,450	46,930	Unknown
1965	10,030	21,710	2,160	21,820	Unknown
1966	14,950	16,660	7,290	34,430	Unknown
1967	7,240	13,710	5,720	49,480	Unknown
1968	6,920	9,200	5,820	48,880	4,200
1969	5,870	5,000	1,150	28,920	1,100
1970	5,750	5,450	600	28,200	222
1971	2,810	2,650	10,730	54,430	10,000
1972	5,040	9,270	16,050	79,000	6,000
1973	6,740	13,120	8,930	24,970	6,685
1974	6,440	13,150	8,500	24,650	2,210
1975	1,400	5,640	8,390	31,970	690
1976	3,380	14,700	13,700	31,850	3,470
1977	20,400	16,070	27,440	21,410	17,090
1978	37,720	35,850	24,530	32,760	18,330
1979	8,400	19,700	26,830	87,920	3,920
1980	27,220	28,670	33,500	83,980	3,220
1981	10,720	21,140	23,720	44,530	4,160
1982	34,500	56,110	10,320	30,790	45,000
1983	8,360	21,210	16,000	34,040	44,000
1984	35,880	28,910	21,970	92,660	3,000
1985	12,300	30,610	58,410	136,970	8,650
1986	35,100	36,200	30,810	40,422	15,230
1987	154,200	61,520	40,580	53,932	76,530
1988	54,780	50,410	19,536	42,476	30,363
1989	11,285	15,338	55,210	138,318	28,480
1990 ²	24,310	25,739	52,984	82,107	11,761
Mean	19,963	21,601	19,097	52,820	14,970

¹ Includes harvest of both the above and below weir spawning components of the late-run return.

² Preliminary data.

Table 17. Historical summary of harvest, angler effort and harvest rate, Russian River sockeye salmon fishery, 1963 - 1990.

Year	Early Run				Late Run				Total			
	Harvest	Days Effort	Hours Effort	Harvest/ Hour	Harvest	Days Effort	Hours Effort	Harvest/ Hour	Harvest	Days Effort	Hours Effort	Harvest/ Hour
1963	3,670	5,710	Unknown		1,390	2,170	Unknown		5,060	7,880	Unknown	
1964	3,550	3,980	13,600	0.261	2,450	1,350	5,070	0.483	6,000	5,330	18,670	0.321
1965	10,030	7,750	37,710	0.266	2,160	1,970	8,280	0.261	12,190	9,720	45,990	0.265
1966	14,950	11,970	63,080	0.237	7,290	6,310	28,700	0.254	22,240	18,280	91,780	0.242
1967	7,240	11,460	62,960	0.115	5,720	5,500	29,490	0.194	12,960	16,960	92,450	0.140
1968	6,920	11,780	66,540	0.104	5,820	5,500	28,250	0.206	12,740	17,280	94,790	0.134
1969	5,870	12,290	61,790	0.095	1,150	2,640	12,230	0.094	7,020	14,930	74,020	0.095
1970	5,750	9,700	48,730	0.118	600	1,000	2,240	0.268	8,350	10,700	50,970	0.125
1971	2,810	6,250	33,060	0.085	10,730	8,870	37,390	0.287	13,540	15,120	70,450	0.192
1972	5,040	12,340	52,500	0.096	16,050	13,360	55,920	0.287	21,090	25,700	108,420	0.195
1973	6,740	15,220	70,950	0.095	8,930	15,470	81,930	0.109	15,670	30,690	152,880	0.102
1974	6,440	11,090	81,330	0.105	8,500	10,030	45,210	0.188	14,940	21,120	106,540	0.140
1975	1,400	5,210	20,590	0.068	8,390	11,300	52,770	0.159	9,790	16,510	73,360	0.133
1976	3,380	8,930	28,910	0.117	13,700	17,380	74,000	0.185	17,080	26,310	102,910	0.166
1977	20,400	38,200	138,580	0.147	27,440	31,310	140,780	0.195	47,840	69,510	279,360	0.171
1978	37,720	51,910	196,590	0.192	24,530	17,950	98,830	0.248	62,250	69,860	295,420	0.211
1979	8,400	25,670	96,300	0.087	26,840	29,330	124,010	0.216	35,240	55,000	220,310	0.160
1980	27,220	31,430	130,820	0.208	33,500	24,900	117,100	0.286	60,720	56,330	247,920	0.245
1981	10,720	24,780	103,130	0.104	23,720	26,250	109,250	0.217	34,440	51,030	212,380	0.162
1982	34,500	39,000	163,140	0.211	10,320	12,480	59,130	0.175	44,820	51,480	222,270	0.202
1983	8,360	18,560	78,550	0.106	16,000	13,300	66,650	0.240	24,360	31,860	145,200	0.168
1984	35,880	29,230	144,680	0.248	21,970	20,320	94,850	0.232	57,850	49,550	239,530	0.242
1985	12,300	16,140	75,000	0.164	58,410	34,630	159,160	0.367	70,710	50,770	234,160	0.302
1986	35,100	29,850	126,720	0.277	30,810	22,400	89,780	0.343	65,910	52,250	216,500	0.304
1987	154,200	80,360	319,820	0.482	40,580	32,650	132,570	0.306	194,780	113,010	452,390	0.431
1988	54,780	46,600	186,390	0.294	19,540	25,430	94,840	0.206	74,320	72,030	281,230	0.264
1989	11,290	20,800	79,660	0.142	55,210	39,770	154,510	0.357	66,500	60,570	234,170	0.284
Mean	19,800	21,710	91,150	0.170	17,840	16,060	70,480	0.245	37,640	37,770	161,630	0.208
1990	29,950	44,560	178,230	0.168	52,980	38,030	152,120	0.348	82,930	82,590	330,350	0.251

Table 18. Counts of above and below weir spawners and sport harvests of late-run sockeye salmon returning to the Russian River, Alaska, 1968-1989.

Year	Number of Late-Run Spawners		Estimated Sport Harvest	Estimated Local Return
	Above Weir	Below Weir		
1968	48,800	4,200	5,820	58,820
1969	28,920	1,100	1,150	31,170
1970	28,200	222	600	29,022
1971	54,430	10,000	10,730	75,160
1972	79,000	6,000	16,050	101,050
1973	24,970	6,685	8,930	40,585
1974	24,650	2,210	8,500	35,360
1975	31,970	690	8,390	41,050
1976	31,850	3,470	13,700	49,020
1977	21,410	17,090	27,440	65,940
1978	32,760	18,330	24,530	75,620
1979	87,920	3,920	26,830	118,670
1980	83,980	3,220	33,500	120,700
1981	44,530	4,160	23,720	72,410
1982	30,790	45,000	10,320	86,110
1983	34,040	44,000	16,000	94,040
1984	92,660	3,000	21,970	117,630
1985	136,970	8,650	58,410	204,030
1986	40,422	15,230	30,810	86,462
1987	53,932	76,530	40,580	171,042
1988	42,476	30,363	19,536	92,375
1989	138,318	28,480	55,210	222,008
1990 ¹	82,107	11,761	52,984	146,852
MEAN	55,439	14,970	22,420	92,831

¹ Preliminary data.

Table 19. Kenai River sockeye salmon counts, local late-run Russian River sockeye salmon return and percent of Kenai River sockeye salmon escapement to enter the Russian River, 1968-1990.

Year	Kenai River Sockeye Salmon Sonar Counts	Late-Run Russian River Local Return	Percent of Kenai River Return to Russian River
1968	82,180	58,820	71.6
1969	51,850	31,170	60.1
1970	72,400	29,022	40.1
1971	281,270	75,160	26.7
1972	301,950	101,050	33.5
1973	358,070	40,585	11.3
1974	144,470	35,360	24.5
1975	128,500	41,050	31.9
1976	353,160	49,020	13.9
1977	663,627	65,940	9.9
1978	349,828	75,620	21.6
1979	245,862	118,670	48.3
1980	411,956	120,700	29.3
1981	369,468	72,410	19.6
1982	571,113	86,110	15.1
1983	566,034	94,040	16.6
1984	311,321	117,630	37.8
1985	491,138	204,030	41.5
1986	419,123	86,462	20.6
1987	1,401,123	171,042	12.2
1988	851,960	92,375	10.8
1989	1,598,042	222,008	13.9
1990 ¹	659,520	146,852	22.3
MEAN	464,520	92,831	27.5

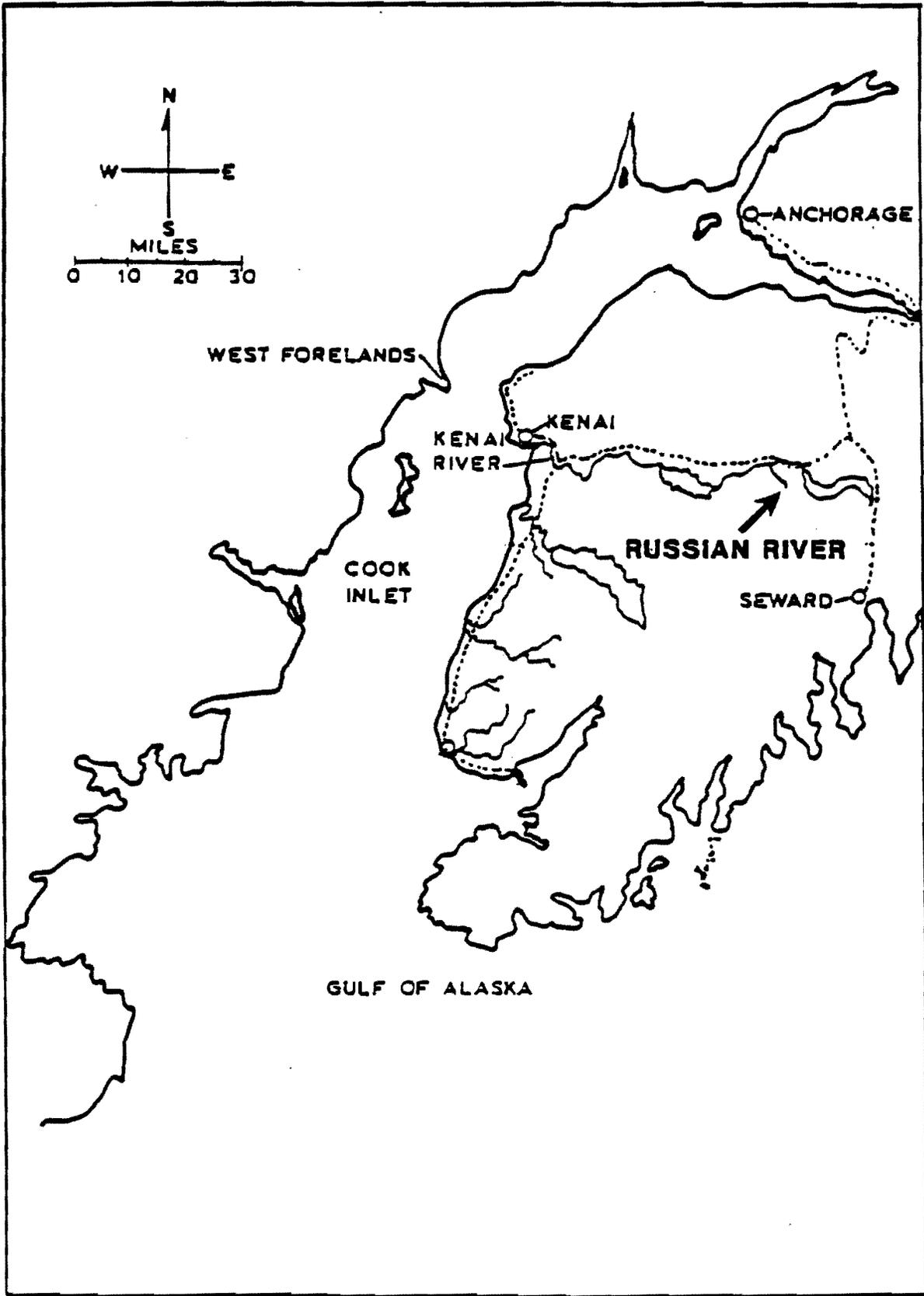


Figure 14. Location of the Russian River in Upper Cook Inlet, Alaska.

CONFLUENCE OF KENAI and RUSSIAN RIVERS

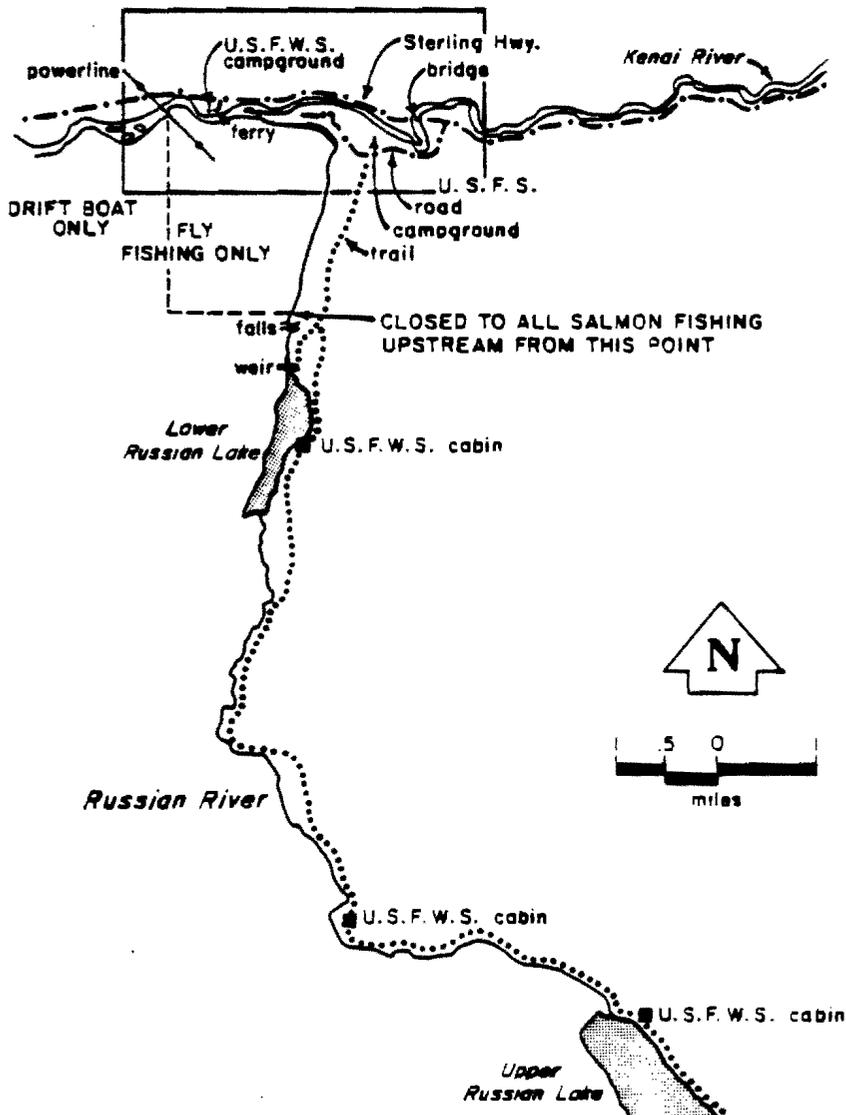
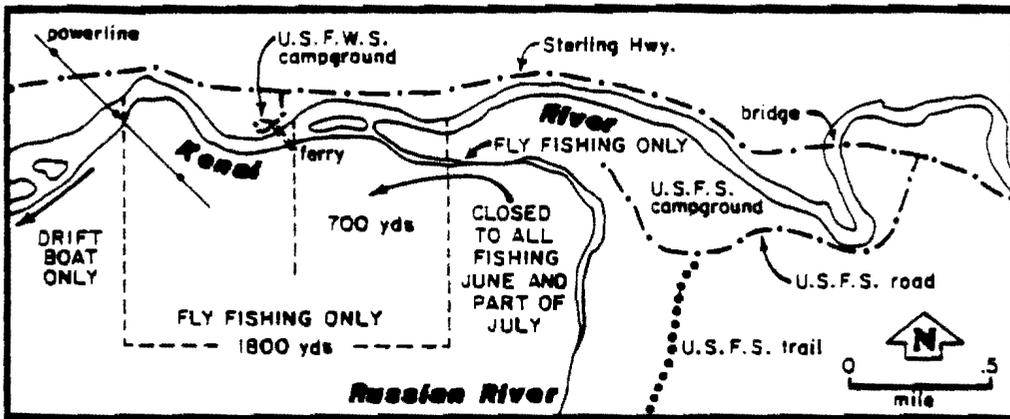


Figure 15. The Russian River drainage.

KENAI RIVER SOCKEYE SALMON DIP NET FISHERY

Background

The Cook Inlet Personal Use Salmon Dip Net Fishery Management Plan prior to 1989 stated that a personal use dip net fishery for sockeye salmon may occur on the Kenai River after an escapement of 500,000 fish was projected. As with other personal use dip net fisheries, only Alaska residents may participate. A sport fishing license is required. The daily bag and possession limit is six sockeye salmon which are not in addition to other marine and freshwater sport fishing limits. Legal gear is confined to a dip net which was redefined by the Board in 1988. Regulations restrict the fishery to the lower section of the river downstream from the Warren Ames Bridge (Figure 16).

Prior to 1987, the Kenai River dip net fishery occurred only in 1982 and 1983. Total escapement in 1982 was 619,800 fish. The dip net fishery was opened July 26. In 1983 the fishery opened July 23. Escapement in that year was 630,000. Fisheries in both years resulted in insignificant harvests (Table 20). Reasons for these low harvests were a combination of unperfected angler technique, relatively clear water and relatively small numbers of fish present in late July and early August in the area in which dip netting was permitted.

On July 22, 1987 the cumulative Kenai River sockeye salmon escapement was 509,432. The dip net fishery was therefore opened at 12 noon, July 23. The fishery was continuous for 13.5 days, closing August 5. Total sockeye salmon escapement to the Kenai River was a record 1.6 million fish.

The 1987 dip net fishery was monitored by creel census. This census estimated a harvest of approximately 20,000 fish. The creel census was conducted at high tide periods because concentrated angler effort was anticipated to occur at these times. However, during the peak of the fishery, dip netting was successfully conducted 24 hours a day, indicating that the creel census was an inaccurate measurement of the harvest. Hence the harvest of

24,090 fish as estimated by Statewide Harvest Study is the more accurate estimate. It was therefore determined that future Kenai River dip net fisheries would be monitored as opposed to censused. Primary purpose of the monitoring program is to provide information to the public regarding the in-season status of the fishery.

There is a 1 to 2 day "lag-time" between entry of sockeye salmon into the Kenai River and the enumeration of those fish by sonar counter located 17 miles upstream from the river's mouth. In 1987 there were therefore about 755,500 fish available to the dip netters of which approximately 3.0% were harvested. Of the total escapement of 1.6 million, dip netters caught 1.5%. As in the Kasilof River, dip netting was conducted from both the river's bank and from small boats. Observation indicated dip netting from boats is the most efficient method.

In 1988 cumulative escapement into the Kenai River was 473,896 on July 21. The dip net fishery was therefore opened by emergency order at 6 p.m., July 22. This corresponded to the opening of the Kasilof River dip net fishery. Both fisheries were conducted over a 14.25 day period, closing August 5. Total escapement to the Kenai River in 1988 was 1,000,000 sockeye salmon. Harvest as estimated by Statewide Harvest Study was 16,880.

1988 Board Action

The Board amended the Cook Inlet Personal Use Salmon Dip Net Fisheries Management Plan. The section of the plan pertaining to the Kenai and Kasilof Rivers now states:

5 AAC 77.545. COOK INLET PERSONAL USE SALMON DIP NET FISHERY MANAGEMENT PLAN. (a) Salmon, other than king salmon, may be taken by dip nets only in areas and during seasons established by emergency order. The department may not allow the taking of salmon by dip nets in the Kenai River until it is determined that the maximum escapement goal of 700,000 sockeye salmon will be met. The department may not allow the taking of salmon by dip nets in the Kasilof River until the minimum

escapement goal of 150,000 sockeye salmon is assured. The Department may allow the taking of salmon by dip nets in locations where artificially produced salmon stocks are returning to areas that have no spawning grounds available for those salmon stocks.

The above plan affected the 1989 season. The previous plan directed that the dip net fishery open when an escapement of 500,000 could be projected. The current plan raises the number which "triggers" the fishery to 700,000.

1989 Season

The Kenai River Personal Use Dip Net Fishery was opened by emergency order at 12:01 a.m., Friday, July 21 and continued through 11:59 p.m., Saturday, August 5. The fishery occurred for 15 continuous days.

The fishery was characterized by:

1. Increased public interest and participation. This is attributed to:
 - a) The absence of the competing Kasilof River dip net fishery which did not occur.
 - b) A general increased interest in personal use and/or subsistence fisheries which is at least in part assumed to be related to news media attention focused on the Kenaitze educational fishery.
 - c) Extensive news media attention directed at the loss of the Cook Inlet commercial drift fleet sockeye salmon season due to the oil spill and accompanying speculation that escapement goals in major river systems would be exceeded which would result in additional sockeye salmon being available for sport and personal use fishermen.

2. Increased use of boats in the fishery. Increased usage of boats was to be expected as dip net fishermen now are universally aware that dip netting from boats increases efficiency on both the Kasilof and Kenai Rivers.
3. Increased media attention directed toward this fishery as well as the Kenai River sockeye salmon sport fishery. Media attention increased because the emergency orders opening the dip net fishery and increasing the sport sockeye salmon bag and possession limit on the Kenai River were issued concomitantly. This is the first time the bag and possession limit has been raised on this sport fishery.

Harvest was estimated by Statewide Harvest Study to be 48,980; participation 31,310 days. Both harvest and participation were the highest recorded. Personal use dip netters harvested 6.0% of the fish available for harvest (Table 20).

1990 Season

The 1990 sockeye salmon return to the Kenai River was 659,520. The fishery is opened when the return is projected to exceed 700,000; there was no Kenai River sockeye salmon dip net fishery this season.

Management Considerations

Interest in this dip net fishery has increased annually. It is this author's opinion that the general public has a poor understanding of the Board's philosophy regarding this fishery and are uninformed regarding the Upper Cook Inlet Salmon Management Plan which allocates the majority of the late run Kenai River sockeye salmon to commercial users. Many personal use dip net fishermen expect this fishery to occur each year simply because it occurred in 1987, 1988 and 1989.

Comments received by the Anchorage Regional and Soldotna Area offices indicated there was considerable dissatisfaction with the current allocation of sockeye salmon in that a personal use fishery occurs only if there is an identified surplus. Many callers expressed a desire to have the Cook Inlet Personal Use Salmon Dip Net Fisheries Management Plan amended to provide for a fishery to occur each season by regulation. These callers expressed a desire to have the personal use fishery placed on a parity with the commercial and sport fisheries when the Board allocates the Kenai River sockeye salmon resource.

Table 20. Kenai River personal use dip net fishery summary, 1981 – 1990.

Year	Date and Time Opened	Date and Time Closed	Total Days	Fish Available During Dip Net Fishery ¹	Harvest	% of Available Fish Harvested	Total Sockeye Salmon Escapement	Percent of Escapement Harvested	% of Escapement Available to Fishery	Participation (Days Fished)
1981				No Fishery			407,600			
1982	7/26 18:00	8/ 5 24:00	9.25		Insignificant		619,800		Insignificant	
1983	7/20 18:00	8/ 5 24:00	15.25		Insignificant		630,000		Insignificant	
1984				No Fishery			344,570			
1985				No Fishery			502,800			
1986				No Fishery			501,160			
1987	7/23 12:00	8/ 5 24:00	13.50	755,500	24,090	3.0	1,600,000	1.5	47.2	22,550
1988	7/22 18:00	8/ 5 24:00	14.25	260,000	16,880	6.5	1,000,000	1.7	26.0	29,010
1989	7/21 00:01	8/ 5 24:00	15.0	812,800	48,980	6.0	1,598,000	3.1	50.9	31,310
Mean			13.45	609,430	29,980	5.2	800,440	2.1	41.4	27,623
1990	No Fishery						659,520			

¹ Total number of fish passing sonar counters during fishery, plus harvest.

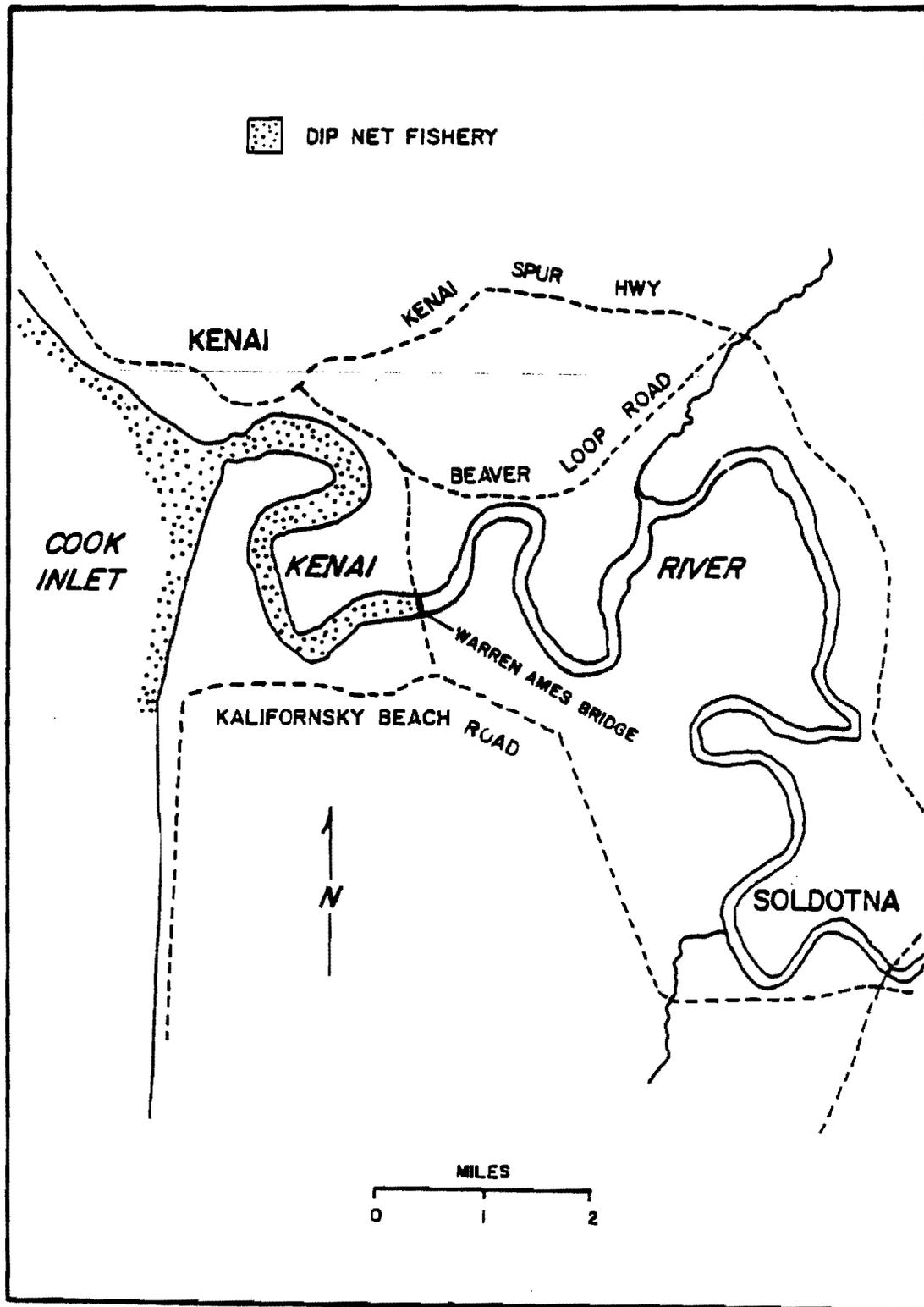


Figure 16. The Kenai River sockeye salmon dip net fishery occurs downstream from the Warren Ames Bridge.

KASILOF RIVER PERSONAL USE DIP NET FISHERY

Background

In the spring of 1981, the Alaska Board of Fisheries adopted a Cook Inlet Personal Use Salmon Dip Net Fishery Management Plan. It was the intent of the Board to provide for salmon dip net fisheries in the waters of Cook Inlet which would allow Alaska residents an opportunity to harvest sockeye salmon for their personal consumptive needs. To prevent disruption to existing fisheries, personal use dip net fisheries do not open until the Department determines that specific escapement goals have been met and/or subsistence, commercial, and other sport users have had, or will have, reasonable opportunity to harvest fish in excess to spawning requirements. From 1981 through 1988 the Kasilof River dip net fishery was open approximately 2-3 weeks each year, from mid-July through early August. The popularity of this fishery increased annually with record levels of both harvest and effort occurring in 1986. Participants in the fishery include local residents as well as residents from other areas in southcentral Alaska.

While sockeye salmon are the target species in the fishery, small numbers of silver salmon and pink salmon are also caught and retained. Fishing takes place from both banks of the Kasilof River as well as from small boats. The majority of the effort occurs along the north bank of the river where there is good road access, parking spaces and, prior to 1988, a public boat launch.

Typically, catch rates are highest during the period approximately 2.5 hours before and after high tide; however, during the peak of large runs, sockeye salmon are harvested at virtually all tide levels.

In 1981 and 1982 harvest and angler participation were determined by creel census. As dip net fishermen harvest sockeye salmon which are surplus to the spawning escapement and the fishery is managed by the numbers of salmon enumerated by sonar counter, the creel census has been reduced to a monitoring program. Primary purpose of this program is to advise dip net fishermen

regarding the in-season status of the fishery. Harvest and estimates of angler participation are currently derived from the Statewide Harvest Study.

Average harvest and angler participation from 1981 through 1988 has been 14,120 fish and 7,170 days fished, respectively. Dip netters have harvested an average of 13.5% of the sockeye salmon entering the Kasilof River during that period of time the season was open. Of the total number of sockeye salmon to enter the river in a given season, this personal use fishery harvests 1% to 14%, averaging 5.3%. In an average year, approximately 44% of the sockeye salmon to enter the river are available to personal use dip net fishermen (Table 21).

Regulations governing this fishery are:

1. The fishery is opened by emergency order when the Department can project a spawning escapement of 150,000 sockeye salmon.
2. Only residents possessing a valid sport fishing license or residents exempt from licensing may participate in the fishery.
3. King salmon may not be possessed and, if caught, must be immediately released.
4. The daily bag and possession limit are six salmon not in addition to other sport caught fish.
5. A dip net is defined as a bag shaped net supported on all sides by a rigid frame. The maximum straight line distance between any two points on the net frame as measured through the net opening may not exceed 5 feet. The depth of the bag must be at least one-half the greatest straight line distance as measured through the net opening. No portion of the bag may be constructed of webbing which exceeds a stretched measurement of 4.5 inches. The frame must be attached to a single rigid handle and is operated by hand. (This definition approved by the Board in spring of 1988.)

6. The area open to fishing is in Cook Inlet at the mouth of the Kasilof River within ADF&G regulatory markers and upstream for a distance of 1 mile in the River (Figure 17).

1988 Board Action

The Board of Fisheries amended the Cook Inlet Personal Use Salmon Dip Net Fishery Management Plan. The section of the plan addressing this fishery now reads:

5 AAC 77.545. COOK INLET PERSONAL USE SALMON DIP NET FISHERY MANAGEMENT PLAN. (a) Salmon, other than king salmon, may be taken by dip nets only in areas and during seasons established by emergency order. The department may not allow the taking of salmon by dip nets in the Kenai River until it is determined that the maximum escapement goal of 700,000 sockeye salmon will be met. The department may not allow the taking of salmon by dip nets in the Kasilof River until the minimum escapement goal of 150,000 sockeye salmon is assured. The department may allow the taking of salmon by dip nets in locations where artificially produced salmon stocks are returning to areas that have no spawning grounds available for those salmon stocks.

The amended plan will have no affect on the prosecution of the Kasilof River dip net fishery. The escapement goal for this river is 150,000-250,000 sockeye salmon. The Board has now directed the fishery to open when the minimum goal of 150,000 can be projected. This is the number which "triggered" the opening of the fishery in prior years.

The previous management plan directed that this fishery open when the maximum (then 150,000) goal was achieved. The current plan therefore deviates from the philosophy of prior Boards in that the fishery opens when the minimum goal is projected. This philosophical departure from the previous plan recognized that the Kasilof stocks are in part from hatchery releases. The

Board therefore determined that the best use of the resource was an allocation between commercial and personal use fishermen as there is only a limited sport fishery directed at Kasilof River sockeye salmon.

The Commercial Fish Division will manage the Kasilof River to achieve an escapement of 150,000-250,000. Board action has therefore increased the probability that this fishery will occur annually except in years when the minimum goal of 150,000 cannot be projected.

1989 Season

An escapement of 150,000 could not be projected until August 5, the historical date on which this fishery closes. Escapements after that date were expected to decline to less than 1,000 fish daily. The Kasilof River dip net fishery was therefore not opened because:

1. The minimum spawning escapement could not be projected until after the historic closure date of the fishery.
2. Daily escapements were projected to fall below 1,000 fish after August 5. Harvest and harvest rates in the dip net fishery would be minimal at this sockeye salmon entry rate.
3. The dip net fishery would harvest a disproportionately high number of coho salmon if the season were open after August 5. It was projected that this species would be adequately harvested in the Cook Inlet commercial and Kasilof/Crooked Creek sport fishery.

The 1989 Kasilof River sockeye salmon spawning escapement was 157,739. This was the lowest spawning escapement in the last 9 years.

1990 Season

The sockeye salmon return to this drainage was 144,140. This escapement is the lowest in the last 10 years. The personal use dip net fishery therefore remained closed for the second consecutive season.

Management Considerations

In 1987 the Kasilof River dock and adjacent lands on the north side of the river at its mouth reverted to private ownership. Public use of the launching ramp and surrounding property were, however, not restricted in that year. Following the 1987 season the property owner announced his intention to restrict access in 1988. An agreement was reached, however, between the State and land owner which established a public corridor from the road to the mouth of the river. Foot access to the preferred dip netting area on the north bank was therefore not a problem in 1988 and should not be an issue in succeeding years.

In recent years the use of small boats has increased in this fishery. Dip netters hold the net beside the boat and drift with the current. Staff observation indicates this method is more efficient than dip netting from the bank. Boats were launched from a small ramp. In 1988 the ramp was closed to public use. Although some dip netters launched from the beach, the closure of the ramp reduced the boats employed in this fishery in 1988. Lack of a launching site will continue to be a social issue associated with this fishery.

This fishery is very popular with Alaska residents. Many dip netters, however, are not aware of the Cook Inlet Personal Use Salmon Dip Net Fishery Management Plan and believed the fishery should occur on an annual basis. Public perception regarding Board intent was therefore an issue in years when the fishery did not occur.

Although there was some dissatisfaction voiced by personal use fishermen in 1989 because the fishery did not occur, this dissatisfaction was partially

mitigated because the personal use fishery on the Kenai River was opened. In 1990 neither the Kasilof nor Kenai River dip net fisheries opened because the escapement goals mandated by the management plan were not achieved. Public dissatisfaction with the management plan therefore increased. Many individuals who contacted the Anchorage regional or Soldotna area office believed that the dip net fishery on both rivers should occur annually and that personal use should receive the same consideration as sport and commercial users when the Board allocates this resource.

Table 21. Kasilof River personal use dip net fishery summary, 1981 - 1990.

Year	Date and Time Opened	Date and Time Closed	Total Days	Fish Available During Dip Net Fishery ¹	Harvest	% of Available Fish Harvested	Total Sockeye Salmon Escapement	Percent of Escapement Harvested	% of Escapement Available to Fishery	Participation (Days Fished)
1981	² 7/4 12:00	7/31 24:00	27.50	122,080	10,300	8.4	256,630	4.0	47.6	5,370
1982	² 7/21 12:00	8/5 24:00	15.50	36,930	1,800	4.9	180,240	1.0	20.5	2,580
1983	7/15 24:00	8/5 24:00	21.00	96,500	11,120	11.5	210,270	5.3	45.9	4,420
1984	7/16 12:00	8/5 24:00	20.50	126,930	12,770	10.1	231,690	5.5	54.8	5,960
1985	7/15 18:00	8/5 24:00	21.25	363,590	16,280	4.5	505,050	3.2	72.0	9,260
1986	7/15 06:00	8/5 24:00	21.75	138,500	38,670	27.9	275,960	14.0	50.2	13,930
1987	7/10 12:00	8/5 24:00	25.50	³ 135,560	18,450	13.6	249,250	7.4	54.4	8,910
1988	7/22 18:00	8/5 24:00	14.25	12,950	3,550	27.4	200,000	1.8	6.5	6,930
1989	No Fishery						157,739			
Mean			20.91	129,130	14,120	13.5	251,870	5.3	44.0	7,170
1990	No Fishery						144,140			

¹ Total number of fish passing sonar counters during fishery, plus harvest.

² Harvest and participation during first two years of fishery are field estimates. Starting in 1983, data is from Statewide Harvest Study.

³ The fishery was closed from 6:00am 7/14 - 6:00 7/15 as a precautionary measure due to possible oil contamination.

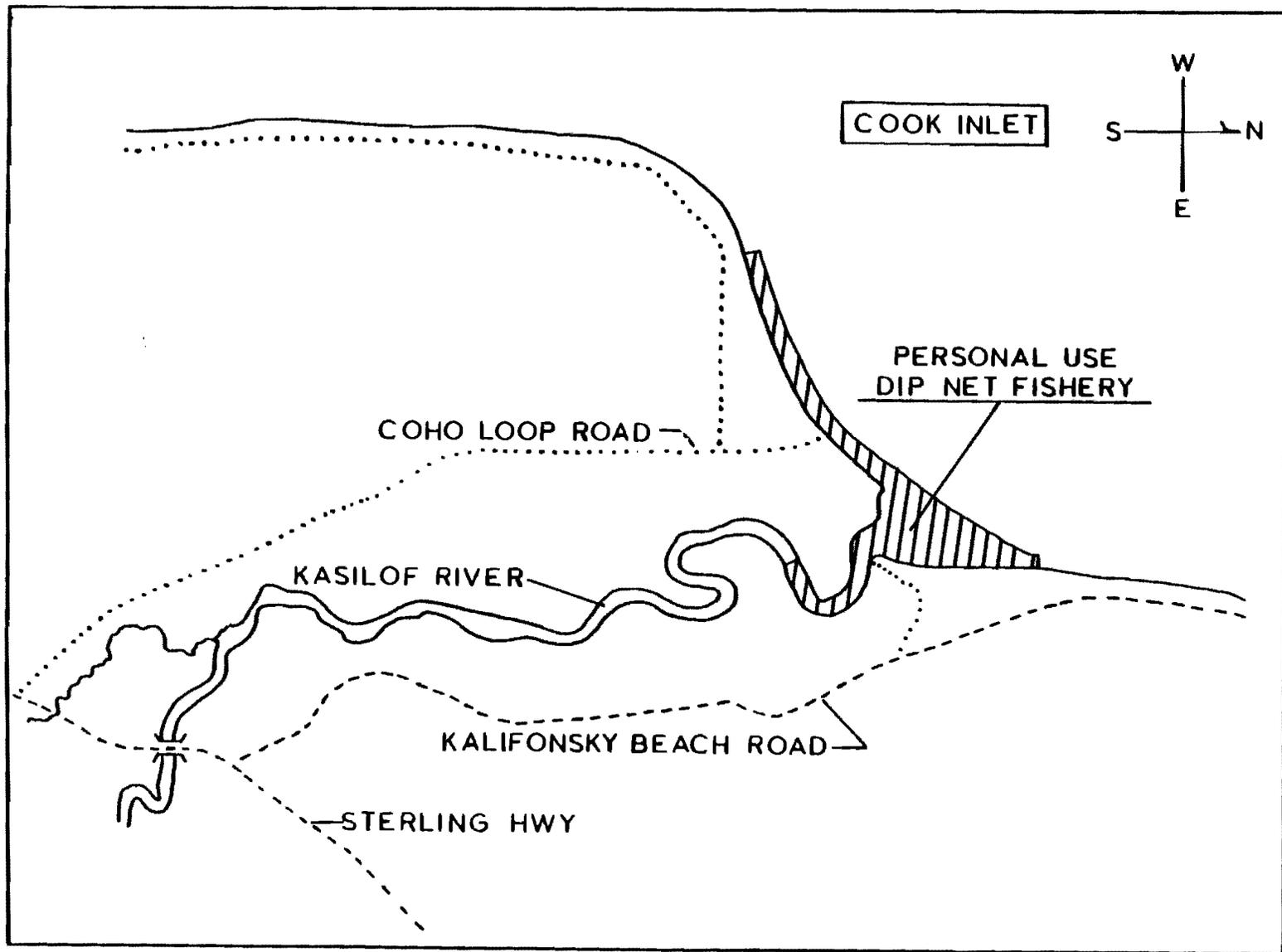


Figure 17. The Kasilof River personal use sockeye salmon dip net fishery.

LOWER PENINSULA COHO SALMON RECREATIONAL FISHERY

Background

The Lower Peninsula coho salmon fishery occurs on the Anchor River, Deep Creek, Ninilchik River and Stariski Creek (Figure 6). The area open to coho salmon fishing on Deep Creek and Ninilchik River is the lower 2 miles as posted; on Anchor River fishing is permitted upstream to the junction of the north and south forks (about 2 miles); on Stariski Creek this species may be taken from salt water upstream to the Sterling Highway Bridge (approximately 1 mile).

Spawning occurs in the upstream areas of these streams. No spawning escapement counts have been conducted except at the weir in Anchor River from 1987-1989. Counts at Anchor River in these years ranged from 2,409-20,184.

Harvests in the aforementioned streams have been determined by Statewide Harvest Study since 1977; in some years a creel census has been conducted on Anchor River. For comparative purposes, harvest estimates for all species in Tables 22 through 25 are determined by Statewide Harvest Study.

Anchor River supports the largest harvest of this species, averaging 2,118 annually. Average harvests in Deep Creek, Ninilchik River and Stariski Creek are 986, 401, and 200, respectively. Predicated on harvest data, the populations in these lower streams are maintaining themselves and support a relatively stable recreational fishery.

Prior to 1989, there was no in-season management of the Lower Peninsula coho salmon fishery.

1988 Board Action

Prior to 1984, bait was permitted in these streams throughout the season. From 1984-1988 bait was permitted from the opening of the general fishing season (July 1) through September 15. In 1988 the Board prohibited the use

of bait after August 14 to provide maximum protection to steelhead trout. This regulation was in effect during the 1989-1990 seasons.

This action was controversial. Some anglers contended this regulation would negatively impact their ability to harvest coho salmon which historically have primarily been taken with bait. There was also concern that this restrictively regulated fishery would reduce angler effort which would negatively affect the economy of the local area.

1989 Season

The creel census initiated in 1987 in conjunction with a Dolly Varden study on Anchor River continued in 1989. The census sampled all effort directed toward coho salmon. A weir has been employed on Anchor river since 1987 to enumerate Dolly Varden. The weir was in place in 1989 and was also used to estimate the coho salmon return to this river.

In 1989 the census revealed angler effort directed toward coho salmon was 15,243 hours; harvest 1,863. Harvest-per-unit-effort (HPUE) was the highest recorded in this 3 year period, 0.1223 or 8.2 hours for each coho salmon retained.

In 1987, 2,409 coho salmon were enumerated at the weir, in 1988, 2,805. In 1989, 20,184 coho salmon passed the structure. An emergency order was therefore issued opening an additional 5 miles of stream in the Anchor River's south fork to fishing for this species. Coho salmon fishing in the south fork was permitted from September 2 through 10.

1990 Season

There are no conservation concerns associated with Lower Peninsula coho salmon. The weir was therefore removed from Anchor River when the majority of the Dolly Varden migration had passed the site (August 15).

The creel survey revealed an above average return of coho salmon to all Lower Peninsula streams. The creel survey indicated anglers expended 20,146 hours to harvest 1,987 coho salmon in Anchor River. The harvest rate was one fish/10 hours fished. Harvest is the highest in the last 3 years.

In early September, fall rains raised water levels in all Lower Peninsula streams. High, turbid water reduced angler efficiency. Reduced efficiency prompted some anglers to fish this species in other fisheries, offering a higher probability of success. The latter part of the coho salmon fishery was therefore "lost" because of unfavorable water conditions.

Management Considerations

Data and staff observation indicates:

1. The Anchor River coho salmon harvest fluctuates regardless of the numbers of fish present. In 1987 and 1988 bait was permitted through September 15. The 1987 harvest was greater than the 1988 harvest despite the presence of more coho salmon in 1988. This is because low water in 1987 delayed upstream migration; coho salmon were available in the lower river for an extended period of time. In 1988 high water accelerated the migrational rate; coho salmon were available for a more abbreviated period of time in that section of the river open to salmon fishing.
2. Large numbers of coho salmon will not necessarily increase angler participation. The 1989 return was at record levels. An emergency order increased by 5 miles the area open to coho fishing. A news release issued with the emergency order announcement indicated that large numbers of coho salmon were available to anglers. Participation in the 1989 fishery was less than in the 1987 fishery despite the presence of about five times more fish in 1989 compared to 1987.

3. Coho salmon harvest rates in 1989 (when bait was not permitted) exceeded harvest rates in either 1987 or 1988 (bait was permitted). However, an above average return in 1989 undoubtedly contributed to the high harvest rate.

There are no biological management concerns associated with the Lower Peninsula coho salmon fishery. Harvest data indicate a stable fishery; total return in 1989 and 1990 were above average levels.

Social concerns focus on the prohibition of bait after August 14. There is concern in the community of Anchor Point that prohibiting bait in this fishery tended to depress angler participation despite the 1989 and 1990 above average returns, i.e. anglers who historically fished here with bait relocated to other fisheries where bait was legal terminal gear.

A secondary social concern to some Anchor River anglers is the placement of Anchor River weir. Their concern is that the weir slows the upstream migration of fish (primarily coho salmon). Once this species passes through the structure, anglers contend that their migrational rate accelerates and these salmon move rapidly into either the Anchor River's north or south fork. Since salmon fishing is permitted only downstream from the north and south forks, the criticism is that the present placement of the weir has reduced the productive coho salmon fishing area by about 50%.

Staff observation indicates anglers now tend to fish downstream from the weir. The siting of the weir, however, has not negatively affected the harvest as harvest in 2 of the last 3 years has been above average.

The Anchor River weir's primary purpose is to enumerate Dolly Varden. As it was removed August 15, 1990, it was not an issue in this year's coho salmon fishery. In 1991 it will again be removed in mid-August. Tentative plans call for the weir to enumerate steelhead in 1992.

Prohibiting the use of bait after August 15 does reduce harvest rates in this fishery. The Kenai Peninsula Steelhead Planning Team has recommended and submitted a proposal to permit bait in Lower Peninsula streams through August 31. Please see the section on Lower Peninsula Steelhead Trout for a discussion of this proposal's affect on the coho salmon and steelhead fisheries.

Table 22. Angler participation and harvest of king, coho, and pink salmon; Dolly Varden, rainbow trout, and steelhead trout, Anchor River, 1977 - 1989.

Year	HARVEST ¹						Total Harvest	Days Fished
	King Salmon	Coho Salmon	Pink Salmon	Dolly Varden	Rainbow Trout	Steelhead Trout		
1977	1,077	1,339	27	9,222	1,027	1,072	13,764	31,515
1978	2,109	1,559	139	17,357	551	1,754	23,469	42,671
1979	1,913	4,006	18	21,364	1,000	782	29,083	44,220
1980	605	2,649	339	10,948	345	841	15,727	33,272
1981	1,015	2,949	11	15,271	151	777	20,174	34,257
1982	650	2,379	161	10,375	147	551	14,263	24,709
1983	1,206	1,395	252	17,277	504	1,101	21,735	28,881
1984	873	1,135	249	5,599	224	761	8,841	26,919
1985	386	2,239	124	7,716	52	423	10,940	31,715
1986	1,001	1,021	136	3,914	138	382	6,592	34,938
1987	725	2,010	54	2,735	181	462	6,167	39,045
1988	862	2,219	109	2,746	36	164	6,136	24,356
1989	562	2,635	115	1,476	95 ²	1,971 ²	6,854	19,145
Mean	999	2,118	133	9,692	342	849	14,134	31,973

¹ All harvest data is from Statewide Harvest Study.

² Rainbow/steelhead trout caught and released. Retention of this species prohibited.

Table 23. Angler participation and harvest of king, coho, and pink salmon; Dolly Varden, rainbow trout, and steelhead trout, Ninilchik River, 1977 - 1989.

Year	HARVEST ¹						Total Harvest	Days Fished
	King Salmon	Coho Salmon	Pink Salmon	Dolly Varden	Rainbow Trout	Steelhead Trout		
1977	1,168	122	0	424	170	60	1,944	11,350
1978	1,445	88	46	1,003	217	90	2,889	14,173
1979	1,493	200	0	2,390	382	127	4,592	18,282
1980	723	321	260	853	91	290	2,538	19,706
1981	1,372	432	0	875	162	302	3,143	14,184
1982	1,079	241	10	514	52	127	2,023	11,806
1983	808	210	42	199	31	126	1,416	9,458
1984	536	549	150	524	50	87	1,896	10,122
1985	871	697	0	87	451	50	2,156	10,213
1986	368	336	13	505	199	76	1,497	9,250
1987	1,088	924	108	507	199	92	2,918	13,329
1988	739	709	36	655	218	54	2,411	12,533
1989	521	379	216	39	20 ²	485 ²	1,660	9,997
Mean	939	401	68	660	172	151	2,391	12,646

¹ All harvest data is from Statewide Harvest Study.

² Rainbow/steelhead trout caught and released. Retention of this species prohibited.

Table 24. Angler participation and harvest of king, coho, and pink salmon; Dolly Varden, rainbow trout, and steelhead trout, Deep Creek, 1977 - 1989.

Year	HARVEST ¹						Total Harvest	Days Fished
	King Salmon	Coho Salmon	Pink Salmon	Dolly Varden	Rainbow Trout	Steelhead Trout		
1977	425	306	109	1,330	300	269	2,739	11,399
1978	804	1,383	294	3,046	127	371	6,025	13,872
1979	703	362	9	2,027	118	145	3,364	12,560
1980	182	478	321	1,028	97	139	2,245	8,796
1981	518	464	11	1,382	108	140	2,623	10,127
1982	723	366	293	1,247	52	187	2,868	12,149
1983	986	545	42	1,112	189	126	3,000	13,505
1984	624	1,197	112	973	87	224	3,217	15,760
1985	174	2,301	37	850	104	75	3,541	19,802
1986	879	588	52	306	612	76	2,513	17,354
1987	580	1,050	18	72	54	31	1,805	16,734
1988	654	1,528	72	219	200	91	2,764	12,115
1,989	752	2,254	28	333	209 ²	200 ²	3,776	13,414
Mean	616	986	108	1,071	174	160	3,114	13,661

¹ All harvest data is from Statewide Harvest Study.

² Rainbow/steelhead trout caught and released. Retention of this species prohibited.

Table 25. Angler participation and harvest of king, coho, and pink salmon; Dolly Varden, rainbow trout, and steelhead trout, Stariski Creek, 1977 - 1989.

Year	HARVEST ¹						Total Harvest	Days Fished
	King Salmon	Coho Salmon	Pink Salmon	Dolly Varden	Rainbow Trout	Steelhead Trout		
1977	No	133	26	461	170	124	914	1,442
1978	Fishery	201	15	1,012	90	262	1,580	3,662
1979		275	0	2,027	118	118	2,538	1,965
1980		155	0	327	26	79	587	1,499
1981		410	0	875	32	86	1,403	1,080
1982		119	0	348	0	59	526	1,023
1983		251	0	283	0	42	576	877
1984		0	0	499	0	137	636	519
1985	Data not collected.							
1986		187	0	183	0	31	401	1,162
1987		127	0	199	0	62	388	1,612
1988		146	0	182	0	18	346	804
1989		396	0	0	10 ²	0 ²	406	1,533
Mean		200	3	533	37	85	858	1,432

¹ All harvest data is from Statewide Harvest Study.

² Rainbow/steelhead trout caught and released. Retention of this species prohibited.

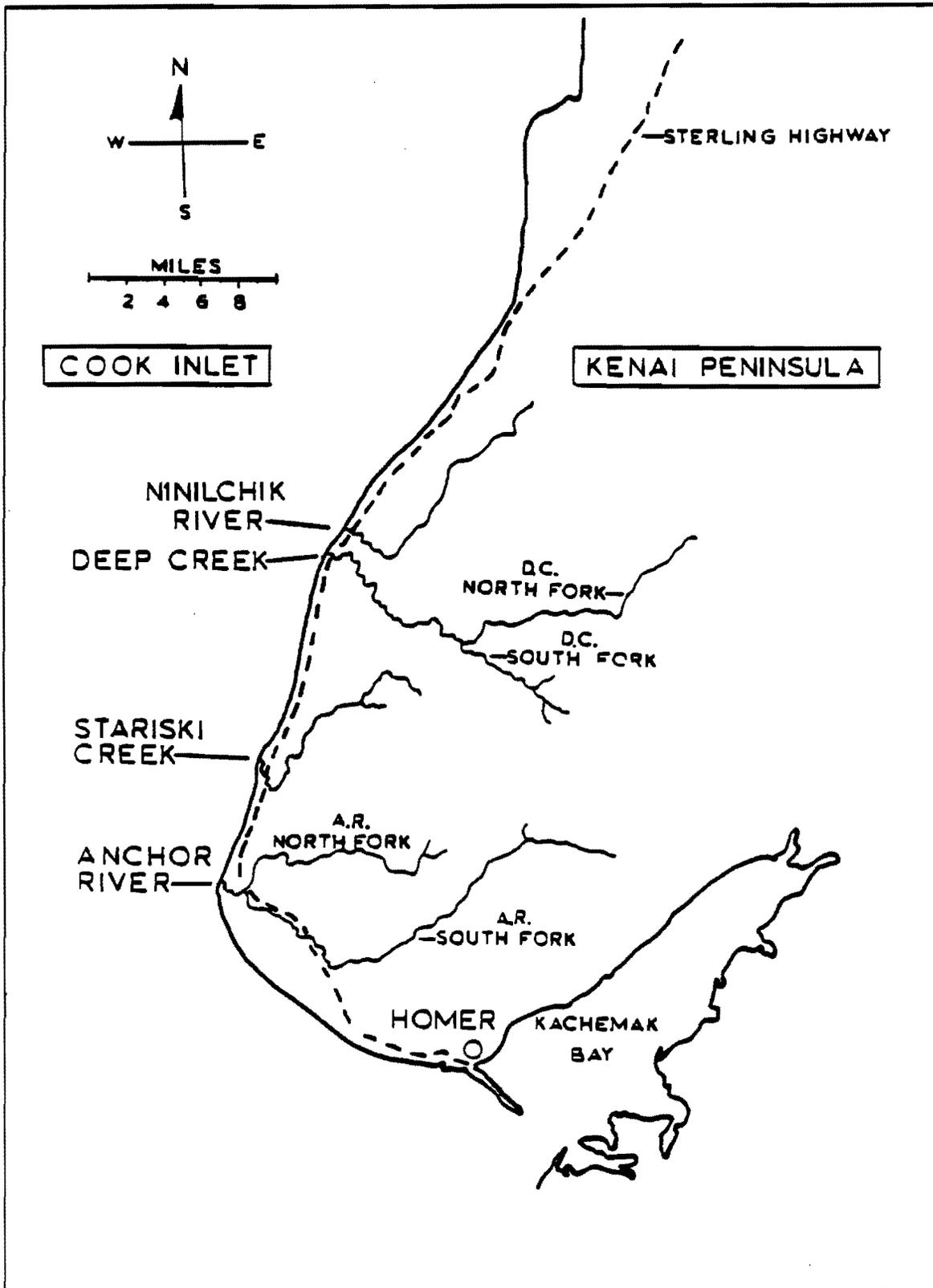


Figure 6. Lower Kenai Peninsula king salmon fishery occurs on Anchor River, Deep Creek, and Ninilchik River.

KASILOF RIVER/CROOKED CREEK COHO SALMON RECREATIONAL FISHERY

Background

The Kasilof River and its major tributary, Crooked Creek, support wild, early run coho salmon (Figure 7). Limited data are available regarding the Kasilof River run. It is known that this run contributes to the Cook Inlet commercial fishery, has run timing similar to early run Kenai River coho (late July-August) and spawns in tributaries to Tustumena Lake. A small sport fishery targeting this run occurs at the mouths of these tributary streams. A limited harvest of these fish also occurs in the mainstem Kasilof River sport fishery which is experiencing an increase in participation.

Crooked Creek wild stocks supported a very minor sport fishery prior to 1984 with harvests ranging from 325-409 from 1981-1983. Total historical return to this stream is estimated at 1,000-2,000 coho salmon.

Enhanced coho salmon began to return to this stream in 1985 with harvest that year estimated at 560. Harvests have increased since that year with 1,783, 3,785 and 2,983 harvested in 1986, 1987 and 1988, respectively. These data indicate the development of a major coho salmon fishery in this drainage. It should also be noted that this enhanced run contributes to the Cook Inlet commercial fishery.

1989 Season

The 1989 coho salmon harvest in the Kasilof River was estimated at 4,222; in Crooked Creek, 1,952. A total harvest of 6,174 fish indicates the continued expansion of this fishery, the annual harvest of which exceeded the combined harvest of wild stocks from the Anchor River, Ninilchik River and Deep Creek.

1990 Season

Final harvest estimates for this fishery will be determined by Statewide Harvest Study available in September, 1991. Preliminary estimates indicate a

total return to Crooked Creek of about 4,778 fish. The preliminary harvest estimate is 1,500, a natural spawning escapement of 1,625; 361 fish were used to meet brood stock requirements at Crooked Creek Hatchery and an additional 592 were sold to commercial processors.

Management Considerations

As this fishery targets enhanced stocks, in-season management is not likely to be required. There are no major social or biological issues associated with this fishery.

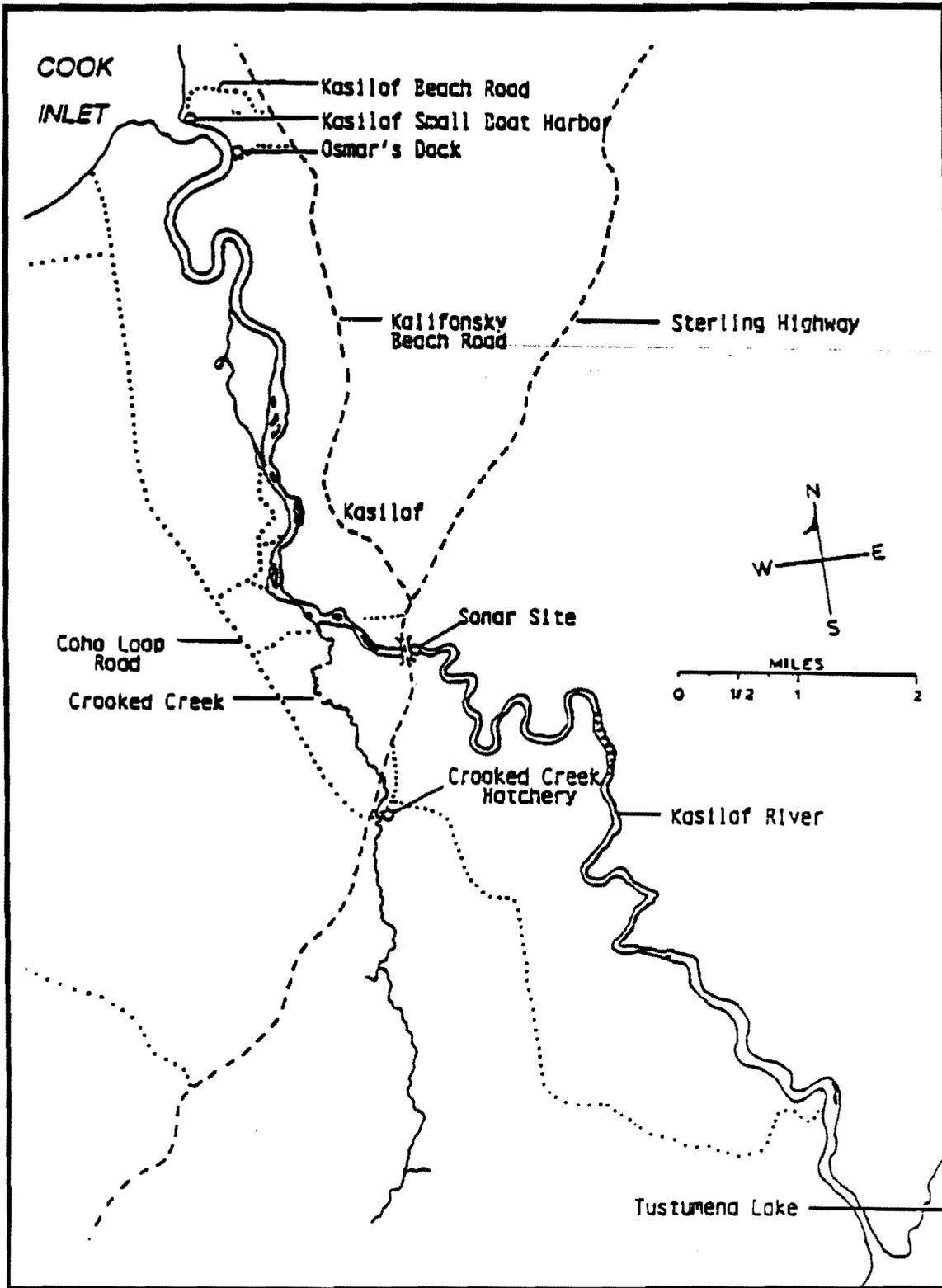


Figure 7. Kasilof River king salmon fishery.

KENAI RIVER COHO SALMON RECREATIONAL FISHERY

Background

Coho salmon are the second most popular species for recreational fishing in the Kenai River. Once the king salmon season terminates July 31, anglers immediately direct their efforts towards coho salmon. Coho anglers fish from anchored boats or from shore as compared to the mobile or drift fishery directed at king salmon.

Coho salmon return to the Kenai River in two runs. Early run fish begin entering the system (Figure 8) in late July and are present through early September. Late run fish begin to appear in late August in the downstream section of the river, peak in September and continue to enter the river at reduced levels until December. The majority of the early and late run harvest occurs downstream from Skilak Lake from early August through early October.

Historically, the early run is the larger of the two. These fish are also harvested by the mixed stock commercial drift gill net and set net fisheries. From 1966 through 1988 the average commercial harvest from the east-side beaches has been approximately 45,850 early run coho salmon. The average annual commercial harvest of late run coho salmon by east side set nets from 1966 to 1978 was 10,560. There has been no commercial fishery on this stock since 1978.

Prior to 1978 the fall subsistence fishery harvested less than 500 coho salmon. In 1981 a court ordered noncommercial fishery resulted in 12,713 coho salmon being harvested from the late run. In 1983 the personal use fishery harvested 712 fish while in 1984, 2,261 fish were harvested in this fishery. A judicial ruling in the spring of 1985 (Madison vs. State of Alaska) resulted in the reimplementation of a subsistence fishery which harvested 11,265 fish from this stock. In 1986 the Alaska Legislature altered the "Subsistence Law" which negated a subsistence fishery but did

allow a personal use fishery. The quota for this fishery is 2,500 late run coho salmon. Harvest from 1986 through 1989 has ranged from 2,213 to 2,662.

The Department has been monitoring the recreational fishery on the Kenai River by creel census since 1976. The interest in coho salmon has increased steadily reaching a peak in 1984 when 60,476 fish were harvested from both runs. Early run harvest has averaged 16,814 fish while the late run has averaged 11,316 (1976 to 1988). Effort has averaged 120,758 and 67,288 angler-hours for the early and late runs, respectively for these years (Table 26).

1988 Board Action

There were no changes in regulation of this fishery. Prosecution of the 1989-1990 fishery was identical to prior years.

Coho Salmon Early Run

1989 Season:

Estimated early run sport harvest was 27,206. Harvest per unit effort was 0.160 which is above the historical mean (0.132). Angler effort was 169,657 hours during the 1989 season.

An additional 81,744 coho salmon were harvested by the Cook Inlet east-side set net commercial fishery. It is assumed that a high percentage of this harvest is of Kenai River origin. The average east-side beach commercial catch approximates 45,000. The 1989 drift gill net fishery did not occur due to the presence of oil in the offshore waters of Cook Inlet.

1990 Season:

Estimated sport harvest was 30,078 fish. This is the second highest harvest recorded in this fishery. Angler effort was 253,825 hours, a record high for

this fishery and 50% above 1989 effort levels. Harvest per unit effort was .119 fish/hour which is below both the mean and 1989 success rate. Reduced success rate is attributable to run strength which was not proportionate to the increased angler effort.

The east side beach commercial harvest of mixed stock early run coho salmon was 40,351. This harvest is below historic levels and is believed to reflect late 1990 run timing. The east side beach commercial fishery concludes August 15; a relatively high percentage of the early run migrated through this area after the closure date and were not subject to harvest in this fishery. Given normal run timing the majority of early run Kenai coho are subject to interception in this fishery.

Coho Salmon Late Run

1989 Season:

Harvest in 1989 is estimated at 16,195 fish. The mean and 1988 harvests are 11,316 and 11,495 fish, respectively. Angler-effort was 82,836 angler-hours which is above the mean effort of 67,288 angler-hours. An additional 2,376 late run coho salmon were harvested in the personal use gill net fishery involving 365 permit holders.

1990 Season:

Late run harvest was 19,677, the third highest harvest recorded. Angler effort was 122,204 angler-hours, the second highest effort recorded and 47% above 1989 effort levels. Coho harvest per hour was 0.161 which is below both the average and 1989 success rates. As with the early run, reduced success rate is a function of run strength which was not proportionate to increased angler effort. An additional 2,310 late run coho salmon were harvested in the fall personal use gill net fishery involving 481 permit holders. Participation in this fishery increased 32% compared to 1989 participation.

Management Considerations

Effort and angler interest directed toward the early run is increasing; there is some public concern regarding the status and allocation of this resource.

Management issues are both biological and allocative. Biological issues include:

1. Although it is assumed high, the contribution of early run Kenai coho to the commercial fishery is not known.
2. There is presently no methodology or program in place capable of enumerating early run Kenai River coho salmon.
3. Since early run coho salmon cannot presently be enumerated in the Kenai River, an escapement goal has not been established.
4. A management plan has not been established for this stock; to date there has been no in-season management of the sport fishery.

The allocative issue is the division of the harvestable surplus between commercial and sport fishermen. This allocation issue will be exacerbated as angler effort increases. To date the Department has not had sufficient data to present to the Board to address this issue. The Sport Fish Division, however, is currently examining the feasibility of estimating inriver abundance.

The late Kenai River coho salmon stock is not subject to commercial exploitation. It is subject to a personal use fishery which has a quota of 2,500 fish. Allocation of this resource is therefore an issue as some sport fishermen contend that inriver success rates decline following a personal use fishing period. Biological considerations are similar to the early run in that:

1. Existing programs and methodologies do not permit enumeration of this stock in the Kenai River.
2. Escapement goals have not been established.
3. A management plan for this resource has not been developed; there is no in-season management of the sport fishery.

Table 26. Historical summary of harvest, angler effort and harvest rate, Kenai River coho salmon fishery, 1976 - 1990.

Year	Early Run				Late Run			
	Harvest	Days Effort	Hours Effort	Harvest/ Hour	Harvest	Days Effort	Hours Effort	Harvest/ Hour
1976	7,711	21,178	84,707	0.091	5,513	11,672	40,852	0.135
1977	7,415	13,576	59,733	0.124	2,371	5,317	24,990	0.095
1978	5,236	17,847	78,446	0.087	6,644	16,376	57,313	0.116
1979	11,122	12,439	68,413	0.163	3,510	7,721	29,339	0.120
1980	15,668	22,095	77,220	0.203	9,545	10,699	37,447	0.255
1981	14,680	25,670	106,543	0.138	6,664	13,198	52,790	0.126
1982	24,827	41,838	167,834	0.148	13,351	16,967	61,082	0.219
1983	12,851	27,938	114,973	0.112	7,549	8,934	46,260	0.163
1984 ¹	28,447	32,522	139,635	0.134	32,029	34,655	134,810	0.238
1985	17,950	30,965	128,480	0.140	22,146	23,988	92,755	0.239
1986	31,070	49,450	206,219	0.151	17,551	23,950	113,072	0.155
1987	17,321	33,521	139,784	0.124	8,735	17,359	69,087	0.126
1988	24,281	47,329	197,867	0.123	11,495	27,477	114,944	0.100
1989	27,206	40,688	169,657	0.160	16,195	20,806	82,836	0.196
Mean	17,556	29,790	124,251	0.134	11,664	17,080	68,398	0.163
1990	30,078	60,869	253,825	0.119	15,284	25,679	102,716	0.149

¹ Early run HPUE for 1984 reflects only the August fishery. Coho salmon harvested incidental to chinook salmon (9,700) are not included in the HPUE data but are reflected in the early run harvest.

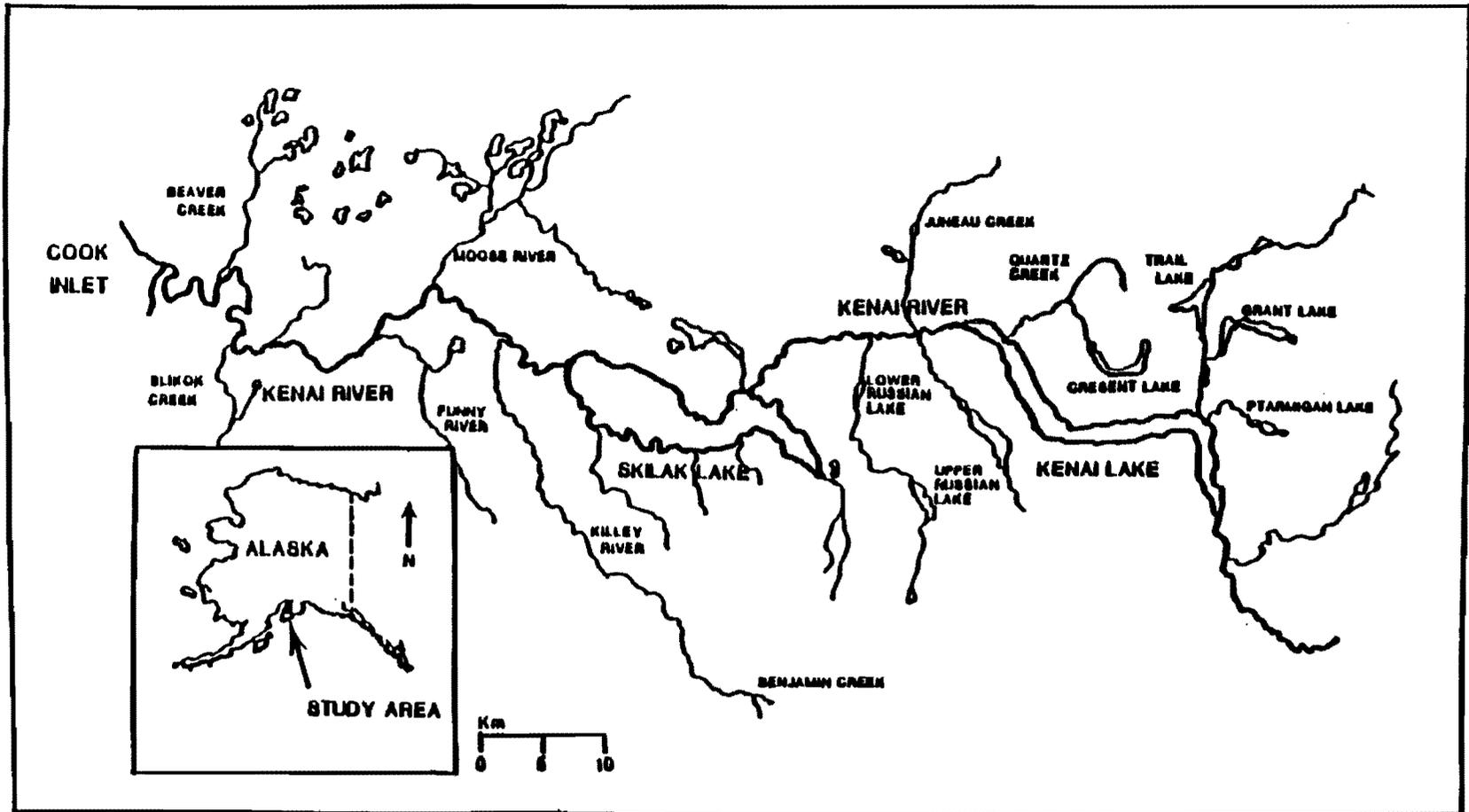


Figure 8. Schematic diagram of the Kenai River Drainage.

KENAI RIVER RAINBOW TROUT AND DOLLY VARDEN RECREATIONAL FISHERIES

Background

The Kenai River is the most heavily utilized river for freshwater sport-fishing in Alaska. Although most of the anglers participated in the river's salmon fisheries, the Kenai River also supports a major rainbow trout fishery with catches ranging from 8,720 to 17,800 annually.

Increasing public concern for the rainbow trout resource and a paucity of biological and fishery data prompted the Alaska Board of Fisheries to adopt increasingly restrictive regulations in recent years, evidenced in the following summary of sport fishing regulations affecting Kenai River rainbow trout.

- 1959-64 Season: Area-wide spring closure from April 1 to about May 26.
Daily bag limit: Combined trout/char/grayling/salmon under 16":
10/day, only 2 over 20".
- 1965-77 Season: Kenai River changes to no closed season.
- 1978 Daily bag limit: (Area-wide) Combined trout/char/grayling/salmon
under 16": 10/day, only 1 over 20".
- 1979 Yearly bag limit: (Area-wide) Harvest record required for
rainbow/steelhead trout over 20" - 2/year.
- 1980-81 Yearly bag limit: (Area-wide) Increased to 5 rainbow/steelhead
trout over 20". Gear restriction: (Kenai River) In flowing
waters upstream from the Moose River to Kenai Lake only single-
hook, artificial lures allowed from January 1 to May 31.
- 1982-83 Season: (Kenai River) Spring closure from January 1 to June 14
(excludes Skilak Lake). Daily bag limit: (Area-wide) Changed to
5 rainbow trout with only 1 over 20".

1984-86 Season: (Kenai River) Spring and fall closure from November 1 to June 14 (includes Skilak Lake). Daily bag limit: (Kenai River) Changed to 3/day, only 1 over 20". Yearly bag limit: (Area-wide) Rainbow/steelhead trout over 20" - Changed to 2/year. Gear restriction: (Kenai River) In addition to spring single-hook, artificial lure restriction, only artificial lures may be used between Skilak and Kenai Lakes from January 1 to December 31.

1987-88 Season: (Kenai River) Spring and fall closure from November 1 through June 14 (includes Skilak Lake).

Daily bag limit: (Kenai River) Reduced to 2/day; one daily over 20".

Yearly bag limit: (Area-wide) Rainbow/steelhead trout over 20" - remained at 2/year.

Gear restriction: (Kenai River) Artificial lures only upstream from Skilak to Kenai Lake. Single hook restriction repealed. No bait permitted in Skilak Lake and in the Kenai River downstream to Moose River from November 1 through May 31.

In 1986 the Alaska Department of Fish and Game, in conjunction with the School of Fisheries and Science of the University of Alaska, Juneau, initiated a study of Kenai River rainbow trout. The long-term goal of the study was to compile population and fishery data bases for use in formulation of a drainage-wide management strategy for Kenai River rainbow trout.

The 1986 pilot study had two major components: (1) a creel census; (2) a tag and recapture program designed to estimate the trout population in study area 004 (Figure 18). The population in this 3.5 mile section of the river was estimated at 3,650 trout more than 6 inches in length. It was further estimated that anglers had a minimal harvest, about 2.4% of the population. Hook-and-release was a common angling practice as the creel census revealed that anglers retained a low percentage of the trout caught.

In 1987 the study was expanded to include two additional sections of the river, 002 and 003 (Figure 18). Using electrofishing techniques, a mark/recapture program was conducted to estimate rainbow trout populations in these areas. The population estimate of rainbow trout in 1987 in section 002 was 610; in 003, 2,200; and in 004, 4,950. Exploitation rate, determined from angler returns of tags, ranged from 2.4% to 10.7% of the population with the lowest exploitation rate occurring in section 004, probably due to more restrictive regulations in this section.

Dolly Varden are harvested in all areas of the Kenai River. The season is January 1 through December 31. Prior to 1984 the bag and possession limit was ten Dolly Varden of any size. Beginning with the 1984 season, this limit was reduced to five Dolly Varden of any size. This applied to all Kenai Peninsula waters. Harvest of this species is determined by the Statewide Harvest Study. This study indicates a stable fishery with harvests from 1984-1988 ranging from 5,780-10,980 fish (Table 27).

1988 Board Action

The Board did change the rainbow trout bag and possession limit in that area of the river upstream from Skilak Lake. Existing regulations permitted the retention of two rainbow trout daily in the Kenai River; one of which could be 20 inches or greater in length. In 1989 that area of the Kenai River upstream from Skilak Lake was designated as a "Trophy Area." Bag and possession limit was reduced to one trout 20 inches or greater in length; those less than 20 inches must be released. Terminal tackle was restricted to single hook artificial lures.

The Board did not directly alter trout regulations in the remainder of the river. However, the Early Chinook Salmon Management Plan does affect the trout fishery in that area of the river downstream from Skilak Lake. The management plan for the early run king salmon fishery specifies that until the Department can project a spawning escapement of 9,000 fish, no bait will be permitted downstream from Skilak Lake to Cook Inlet prior to July 1.

The rainbow trout season on the Kenai River begins June 15. Bait, in the area downstream from Skilak Lake, could be used at that time under pre-1989 regulations. In 1989 and subsequent years bait will not be permitted until an escapement of 9,000 early run king salmon can be projected or until July 1, whichever comes first. Trout anglers could therefore theoretically be denied the use of bait for as much as 2 weeks downstream from Skilak Lake if the escapement of early run king salmon is not projected to exceed 9,000.

In adopting these regulatory changes for the upper Kenai River, the Board considered the criteria contained in the Cook Inlet and Copper River Basin Rainbow/Steelhead Trout Management Policy, developed by members of the Cook Inlet Sport Fish Planning Team and the Sport Fish Division staff from Region II. The Board of Fisheries formally adopted this Management Policy for Cook Inlet waters in 1986, amending the policy in 1987 to include the waters of the Copper River Basin.

In designating the Kenai River between Kenai and Skilak Lakes as a "Trophy Area," the Board evaluated the characteristics of the area and fishery against the 12 criteria established under Policy II of the Management Policy. Characteristics of the upper Kenai River which fit the Trophy designation included:

1. The area met the criteria for conservative wild stock yield as hatchery supplemented trout are not present.
2. Research indicated large numbers of trout present.
3. Trout larger than 20 inches are present.
4. The majority of the area is in public ownership.
5. The area has a history of providing the public with a "quality" trout fishing experience.

6. There were no immediately adjacent waters which were designated for special trout management except Russian River. However, a single population is common to both lower Russian River and the upper Kenai River.
7. The Kenai River is more than 75 miles from Anchorage and can therefore be considered "remote" under Policy II designation.

Criteria of Policy II which did not correspond to characteristics common to the upper Kenai River were:

1. Although there is no king salmon fishery here, there was an established coho fishery which employed bait as the primary terminal gear. Only unbaited lures are used in Trophy trout areas.
2. The upper Kenai River is readily accessible. The "Trophy" designation is generally associated with more difficult access.
3. The upper Kenai River is large and glacial. Its appearance is not generally associated with a trout stream.
4. Steelhead trout are not present. Special consideration is given to southcentral Alaska streams which support this species.

1989 Season

Kenai River rainbow trout harvests are determined from the Statewide Harvest Study. Comparable data are available since 1984 (Table 28). As rainbow trout fishermen in all areas of the river practice hook-and-release, the table differentiates between fish caught and fish retained.

In 1989, the area between Kenai and Skilak Lakes was regulated as a "Trophy" area. The more restrictive 1989 fishery in this area reduced the retention rate to a low 3.6%. Average retention rate prior to 1989 was 19.0%

Retention rates in other areas of the river were: upstream, 12.8%; mid-stream, 15.7% and the downstream section, 23.8%. These data indicate anglers have voluntarily adopted a catch-and-release philosophy in this fishery as retention rate for all sections of the river averaged 10.9%. This equates to a seasonal harvest of 1,910 trout, the lowest harvest in the last 6 years.

The 1989 Dolly Varden harvest was 10,060. This is comparable to the 1989 estimate and within the historical range (5,780-10,980).

1990 Season

Catch and harvest of rainbow trout in this fishery is determined by Statewide Harvest Study. Data for this season will not be available until September, 1991. Observation by staff and comments received from the angling public indicated the 1990 season was prosecuted in a normal manner.

Russian River is a tributary to the Kenai River upstream from Skilak Lake. The trout fishery in this stream is restricted to catch-and-release in the lower river downstream from Lower Russian Lake. Lower Russian River is a spawning area for trout of Kenai River origin. This area is closed to all fishing from April 15 through May 30 to protect these spawning fish.

In late May, large numbers of spawning fish were observed in lower Russian River. Russian River downstream from Lower Russian Lake was therefore closed to all fishing by emergency order through June 8 to provide additional protection to these trout.

Management Considerations

As previously noted, regulation of the Kenai River rainbow trout fishery has become increasingly restrictive. As is evidenced by the relatively low retention rate, anglers utilize the river's trout population as a fishery for sport rather than food. Research has revealed anglers are exploiting a very low percentage of the population in addition to ascertaining that the population is comprised of eleven age classes. The growth of individual fish

within the population is also quite rapid. This is probably related to available food supply provided by exceptionally high sockeye salmon returns to both the Kenai and Russian Rivers in recent years. Data from the 1986-87 rainbow trout study show approximately 15.6% of the rainbow trout length composition to be 20 inches or greater and 0.8% to be 26 inches or greater. Given the above information, it is concluded that the Kenai River trout population is maintaining historical age and size composition under the present regulatory regime.

In recent years a relatively intense trout fishery has developed at the inlet to Skilak Lake. Anglers generally fish here within a half mile radius of the Kenai River. The trout season in Skilak Lake is identical to that of the upper Kenai River (April 15-October 31) as is the bag and possession limit (one daily; 20 inches or larger). However, anglers may use bait throughout the year in Skilak Lake as well as multiple single and/or treble hooks. The fishery in this area therefore has regulatory characteristics of both the Trophy Trout area upstream and the more liberal bait and hook regulations in the remainder of the river.

It is reasonable to assume trout which support this fishery are a segment of the population which inhabits the "Trophy Trout" area between Skilak and Kenai Lakes. In keeping with the Cook Inlet and Copper River Basin Rainbow/Steelhead Trout Management Policy, the Board may wish to expand the "Trophy Trout" area to include Skilak Lake within a half mile radius of the Kenai River inlet.

The Dolly Varden fishery is a stable fishery. Minimal data are available on Kenai River Dolly Varden, however, the rainbow trout study in 1987 did obtain information indicating the percent of the length composition 20 inches or greater was 8.28%, and for fish 26 inches or greater was 0.1%. Angler satisfaction with the fishery is high; no stock conservation issue has been identified by the Department.

Table 27. Kenai River Dolly Varden harvest by river section as determined by Statewide Harvest Study, 1984 - 1989.

Year	Downstream		Mid-stream		Upstream		Skilak Lake to Kenal Lake		Total
	Number	Percent	Number	Percent	Number	Percent	Number	Percent	Number
1984	2,470	28.1	520	5.9	2,380	27.1	3,420	38.9	8,790
1985	2,640	30.2	740	8.5	3,000	34.3	2,370	27.1	8,750
1986	1,250	21.6	770	13.3	1,930	33.4	1,830	31.7	5,780
1987	2,430	31.8	1,670	21.9	2,140	28.0	1,390	18.2	7,630
1988	3,530	32.1	1,270	11.6	3,530	32.1	2,650	24.1	10,980
Mean	2,460	28.8	990	12.2	2,600	31.0	2,330	28.0	8,390
1989	3,410	33.9	1,370	13.6	3,650	36.3	1,630	16.2	10,060

Table 28. Kenai River rainbow trout, number caught vs number retained by river section as determined by Statewide Harvest Study, 1984 - 1989.

Year	Downstream Section			Midstream Section			Upstream Section			Skliak Lake to Kenai Lake			Kenai River Total		
	Number Caught	Number Retained	Percent Retained	Number Caught	Number Retained	Percent Retained	Number Caught	Number Retained	Percent Retained	Number Caught	Number Retained	Percent Retained	Number Caught	Number Retained	Percent Retained
1984	3,460	710	20.5	2,910	1,250	43.0	5,110	580	11.4	4,200	930	22.1	15,680	3,470	22.1
1985	3,400	880	25.9	2,650	850	32.1	5,410	1,500	27.7	3,520	710	20.2	14,980	3,940	26.3
1986	2,570	620	24.1	2,380	170	7.1	1,750	900	51.4	2,020	730	36.1	8,720	2,420	27.8
1987	2,220	520	23.4	3,450	670	19.4	6,430	630	9.8	3,870	360	9.3	15,970	2,160	13.7
1988	2,780	290	10.4	1,560	220	14.1	5,880	1,060	18.0	7,580	560	7.4	17,800	2,130	12.0
Mean	2,890	600	20.9	2,590	630	23.1	4,920	930	23.7	4,240	660	19.0	14,630	2,830	20.4
1989	2,020	480	23.8	2,230	350	15.7	6,470	830	12.8	6,870	250	3.6	17,590	1,910	10.9

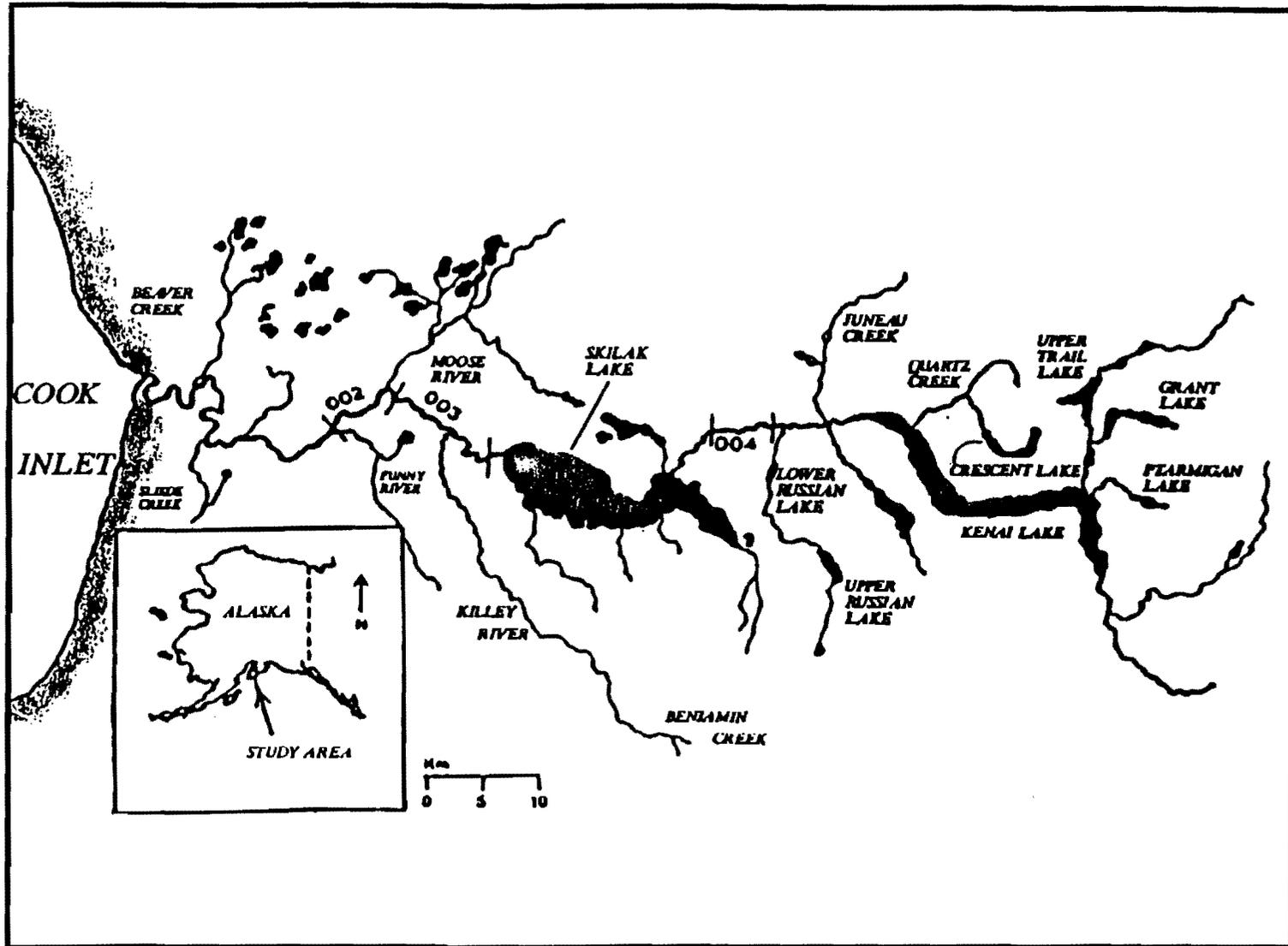


Figure 18. Schematic diagram of the Kenai River rainbow trout study sites: 002, 003, and 004.

LOWER PENINSULA DOLLY VARDEN RECREATIONAL FISHERY
WITH EMPHASIS ON ANCHOR RIVER

Background

The Anchor River is the most heavily fished of the Lower Kenai Peninsula streams, averaging 31,973 angler-days of fishing effort each year. Although the stream's reputation for excellent angling is generally attributed to its populations of king salmon, silver salmon and steelhead trout, Dolly Varden have historically contributed the most fish to the anglers' creel.

Peak harvest for this species in the Anchor River occurred in 1979 when 21,364 Dolly Varden were caught. Harvests to present have exhibited a downward trend (Table 29, Figure 19). From 1980 to 1983 the annual harvest ranged between 10,375 and 17,277. Increasingly restrictive regulations have undoubtedly limited the annual harvest. Nonetheless, a decline from a harvest of 21,364 in 1979 to a harvest of 2,653 in 1987 is significant and led to the design of a research project to study this resource.

The primary means for determining the status of the population is a weir. In 1987 the structure was installed July 3 and removed September 10. It was located about 1.0 miles upstream from Cook Inlet. During this time period 19,062 Dolly Varden were enumerated (Figure 20) of which 3,200 were tagged (16.8% of the return). Purpose of the tagging here and in other Lower Peninsula streams included in the study area (Figure 21) was to determine migratory habits of this species. Other species counted through the weir were: 2,408 coho salmon; 2,020 pink salmon; 300 king salmon and 137 steelhead trout. It is assumed the majority of the Dolly Varden, coho salmon and pink salmon were enumerated. The majority of the king salmon entered the river prior to July 3 and a high percentage of the steelhead population is known to enter the stream after the weir was removed.

Tagging of Dolly Varden was also conducted in Deep Creek and Ninilchik River in 1987. Capture method was by seine.

In 1988 the Anchor River weir was operational July 4. It was to remain in place until November 15 or until rendered inoperable by stream conditions. The scope of the project was therefore expanded to include enumeration of steelhead trout. Through October 13, 14,935 Dolly Varden were enumerated. Of this total, 3,003 were tagged. Other species counted through the weir were 245 king salmon, 777 pink salmon, 30 sockeye salmon, 858 steelhead trout and 2,778 coho salmon.

Tagging was conducted at Ninilchik River. Capture method was by weir which was in place from July 11 through August 12. The weir captured 1,139 Dolly Varden; 776 were tagged.

The fish disease, furunculosis, was observed in the Dolly Varden population in Anchor River in 1987-88 and Ninilchik River in 1988. This disease occurs naturally, however, fish most affected were those subjected to stress (tagging, hook-and-release, and predatory wounds) during relatively warm water conditions. Stress due to tagging was minimized by reducing tagging goals from 25% to 10% in 1989 and altering the tagging methodology. Approximately 7% of the total Dolly Varden population observed at the Anchor River weir site was affected with this disease.

1988 Board Action

The Board promulgated no regulations specifically directed at Dolly Varden. In considering rainbow/steelhead trout the Board did reduce the period of time bait was permitted in Lower Peninsula streams. In prior years bait was prohibited after September 15. In 1989-90 bait was prohibited after August 15.

1989 Season

The Anchor River weir was operational July 4; removed November 8. Through that date 11,384 Dolly Varden migrated through the structure. This was the third consecutive year the number of Dolly Varden passing through the structure declined.

Harvest was estimated by creel census at 1,140; the lowest harvest recorded in this fishery. Total catch was 4,481; retention rate approximated 27%. Forty-four percent of the catch occurred downstream from the weir in July; 40.1% of the harvest occurred here in July. Research indicates the majority of Dolly Varden harvested in July are pre-spawners; juvenile fish enter the river later in the season.

1990 Season

The Anchor River weir was again operational July 4; through August 6, 9,437 Dolly Varden had been enumerated. This was the lowest number of fish to be enumerated by this date since the weir became a research/management tool in 1987. Creel census data for July indicated a harvest of 1,904 Dolly Varden; angler effort was 7,362 hours. The Dolly Varden fishery on the four Lower Peninsula streams of Anchor River, Deep Creek, Ninilchik River and Stariski Creek was therefore closed for the remainder of the season on August 8. Rationale for the closure was:

1. This was the lowest weir count to date since 1987. About 90% of the Dolly Varden migration had passed the weir by August 7, indicating the total return was declining for the fourth consecutive year.
2. The number of angler hours expended in July 1990 was 2.2 times the number of angler hours expended in the July 1989 fishery. The harvest of 1,904 in July 1990 was 2.9 times the July, 1989 harvest. An increasing harvest, which could reasonably be expected to continue in August, would further depress the numbers of fish in this declining population.
3. In July, anglers caught 4,078 Dolly Varden, retaining 1,904. Weir count through July 31 was 8,619. Anglers therefore handled almost 50% of the Dolly Varden to enter Anchor River in July. Some of these fish were handled more than once. Research has indicated hooking and handling increases mortality. Mortality is associated with the stress of being handled, hook injury and the increased probability of contracting the disease, furunculosis. Warm water conditions, which were prevalent in

1990, also increase the probability of hooked and released fish contracting this disease. A high handling incidence was therefore a factor in the closure of this fishery.

4. Staff observation indicated Dolly Varden populations in Ninilchik River, Deep Creek and Stariski Creek have also declined. Closing the Dolly Varden fishery only in Anchor River would have transferred angler efforts to these streams and further reduced these declining populations. The closure therefore encompassed all Lower Peninsula streams even though quantitative data was available only for Anchor River.
5. By August 7, most Dolly Varden have passed the weir and fish that will spawn this year have entered the north and south forks. Observation has indicated few fish remain in the lower river after August 7, therefore, anglers tend to "follow" the fish to the spawning grounds in the north and south forks. As an objective of the closure was to protect the reproductive potential (spawning fish) of the run, the north and south forks were closed to all fishing through August 31. After August 31, the area was open to catch-and-release fishing for steelhead trout. The restriction limiting fishing to the lower area of the river was similarly in affect on the other Lower Peninsula streams.

Anchor River Weir was removed on August 16. Through August 15, 10,427 Dolly Varden were enumerated. Counts through this date in 1987, 1988 and 1989 were 17,774, 14,516, and 10,692. The number of fish to pass the weir in 1990 therefore declined for the fourth consecutive year.

Annual run strength of Anchor River Dolly Varden increased somewhat in 1990. Total annual return in 1987 was estimated at 21,027; 1988, 17,091; 1989, 12,127 and 1990, 12,653. Total return in 1990 increased by an estimated 526 fish compared to 1989. The number of fish to pass the weir in 1990 therefore declined as a direct result of an increased sport harvest, the majority of which occurred downstream from the weir. The closure on August 8 reduced the potential harvest by 25%-30% and was instrumental in ensuring that the number of Dolly Varden to reach the spawning grounds did not further decline.

Management Considerations

The biological issue in this fishery is the declining number of Lower Peninsula Dolly Varden. At present the only reasonable location to address this issue is in the Inriver fishery through the regulatory process even though a limited part of this species life cycle occurs in Lower Peninsula streams. The Sport Fish Division has therefore submitted a proposal for the Board's consideration which reduces the Dolly Varden bag and possession limit from the current five to two fish. This reduction will reduce the harvest by 30% and will affect only 10% of the fishery's participants. Reducing harvest will increase the number of spawning fish and permit the stocks to rebuild to former levels. A more restrictive bag and possession limit, at current or increasing stock levels, will enable the fishery to continue with present time and area regulation, precluding the social disruption of total closure for stock conservation in future years.

Of social concern to some members of the angling public is the siting of the weir. Some anglers contend that the weir delays the upstream migration of all species, more specifically coho salmon, and that the "build-up" of fish below the weir leads to excessive harvest and regulatory violations at the marker located 300 feet downstream from the weir.

The weir is located approximately 1 mile upstream from Cook Inlet. It is above tidal influence on all but the most extreme tides. The present site is also characterized by moderate flow rates and a relatively shallow depth. The substrate is as uniform as can be found in the lower Anchor River. These criteria are critical to the mechanical operation of the weir.

The over-wintering and migratory behavior of Dolly Varden were a primary factor in site selection. Although Dolly Varden in the Anchor River migrate upstream and utilize both the north and south forks, a significant percentage of the population utilizes the lower river above the tidal influence, but below the confluence of the forks. The weir was therefore sited immediately

above the tidal influence in an area having suitable physical stream characteristics. If the weir were sited further downstream it would be rendered inoperable or damaged during high tides. Moving the weir further upstream would result in less than total enumeration of the population since it would be above the spawning and overwintering areas for a percentage of the population.

The Department is attempting to mitigate public concern for the weir through increased information and education activities. In 1990 a pamphlet was published describing the Dolly Varden research project and the need for the weir at its present location.

Illegal fishing activity immediately downstream from the weir has been a concern. If current enforcement coupled with educational efforts do not correct this undesirable situation, the Department will use its emergency order authority to extend the present 300 foot closure further downstream from the structure.

Table 29. Estimated participation (angler days) and harvest of Dolly Varden char (DV), steelhead trout (SH), and coho salmon (SS) on Anchor River, Stariski Creek, Deep Creek, and Ninilchik River, 1977 - 1990.

Year	Anchor River				Stariski Creek				Deep Creek				Ninilchik River			
	Angler Days	Harvest			Angler Days	Harvest			Angler Days	Harvest			Angler Days	Harvest		
		DV	SH	SS		DV	SH	SS		DV	SH	SS		DV	SH	SS
1977	31,515	9,222	1,072	1,339	1442	461	124	133	11,399	1,330	269	306	11,350	424	60	122
1978	42,671	17,357	1,460 ²	1,559	3662	1012	262	201	13,872	3,046	371	1,383	14,173	1,003	90	88
1979	44,220	21,364	610 ²	2,870	1965	2027	118	275	12,560	2,027	145	362	18,282	2,390	127	200
1980	33,272	10,948	830 ²	2,649	1499	327	79	155	8,796	1,028	139	478	19,706	853	290	321
1981	34,257	15,271	570 ²	2,949	1080	875	86	410	10,127	1,382	140	464	14,184	875	302	432
1982	24,709	10,375	370 ²	2,379	1023	348	59	119	12,149	1,247	187	366	11,806	514	127	241
1983	28,881	17,277	430 ²	1,395	877	283	42	251	13,505	1,112	126	545	9,458	199	126	210
1984	26,919	5,559	300 ²	1,135	519	499	137	0	15,760	973	224	1,197	10,122	524	87	549
1985	31,715	7,716	180 ²	2,239	Data not collected				19,802	850	75	2,301	10,213	87	50	697
1986	34,938	3,914	382	1,021	1162	183	31	187	17,354	306	76	588	9,250	505	76	336
1987	39,045	2,653 ²	181 ²	2,230 ²	1612	199	62	127	16,734	72	31	1,050	13,329	507	92	924
1988	24,356	2,915 ²	102 ²	943 ²	804	182	18	146	12,115	219	91	1,528	12,533	655	54	709
1989	19,145	1,140 ²	764 ^{2,3}	1,863 ²	1533	0	0	396	13,414	333	200	2,254	9,977	39	485	397
Mean	31,973	9,670	558	1,890	1,432	533	85	200	13,661	1,071	160	986	12,645	660	151	402
1990		2,226 ^{2,4}														

¹ Participation is for all species including rainbow trout, pink salmon and king salmon.

² Determined by creel survey. All other harvest and angler participation data are from the Statewide Harvest Survey.

³ Beginning in 1989, steelhead/rainbow trout may not be retained or possessed. Estimates are fish caught and released.

⁴ 1990 Dolly Varden season 1 July - 7 August. Closed by E. O. after August 7.

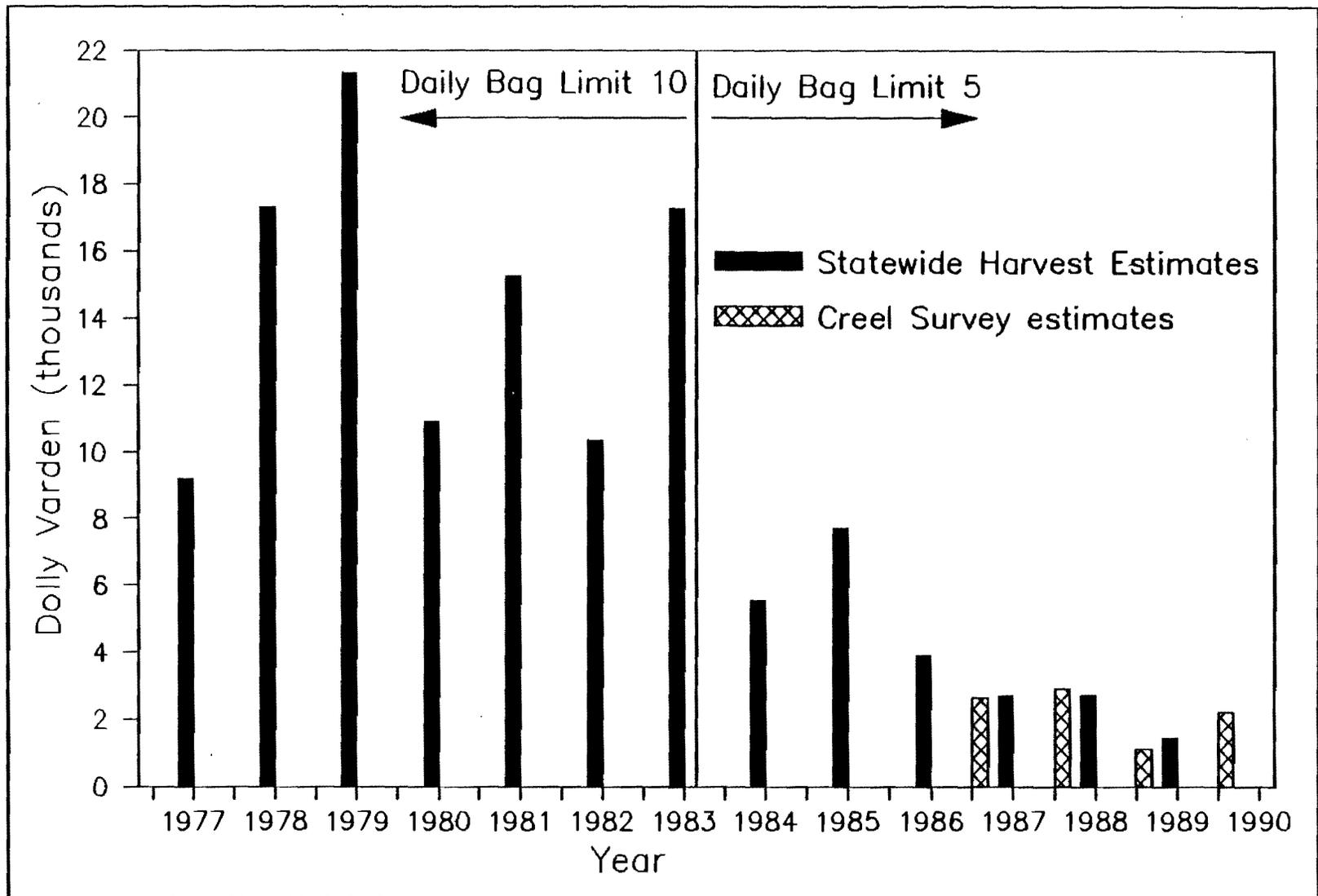


Figure 19. Anchor River Dolly Varden sport harvest estimates from the Statewide harvest surveys and in-season creel surveys, 1977-1990.

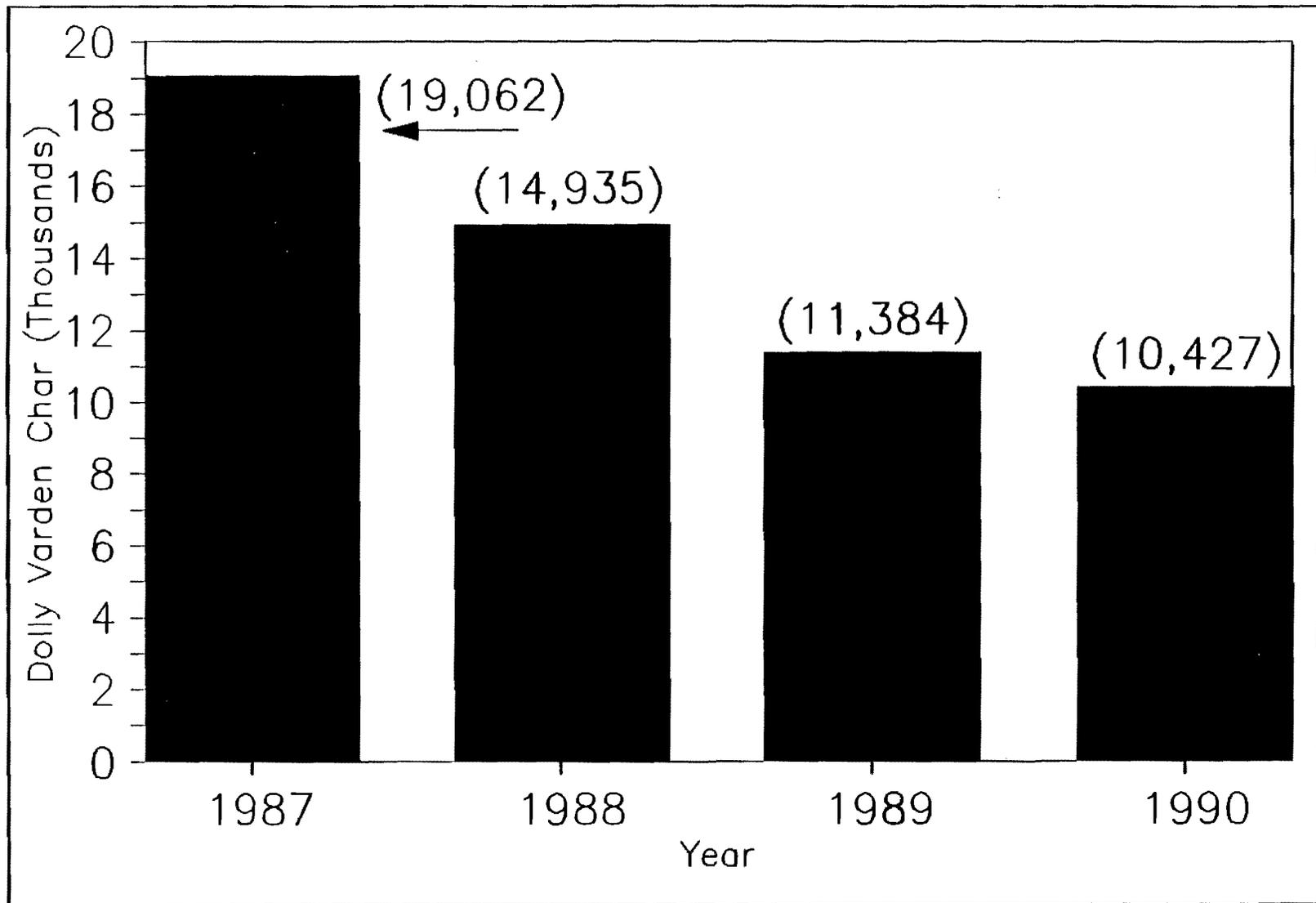


Figure 20. Dolly Varden enumerated at the Anchor River weir, 1987-1990.

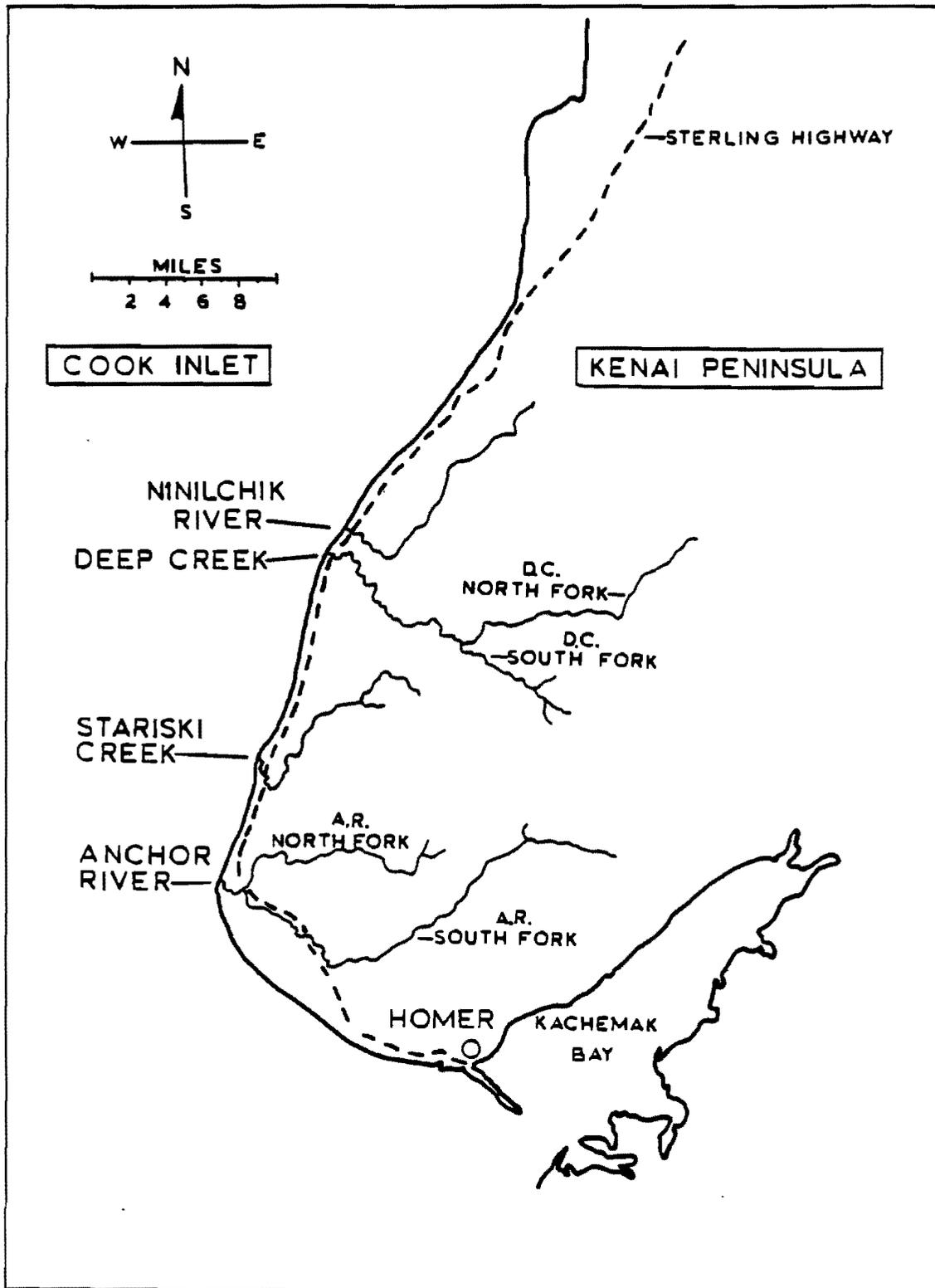


Figure 21. The Anchor River Dolly Varden study area includes the Anchor River, Deep Creek, and Ninilchik River.

KASILOF RIVER/CROOKED CREEK STEELHEAD TROUT RECREATIONAL FISHERY

Background

The mainstem Kasilof River is not known to support a wild steelhead run. Crooked Creek, tributary to the Kasilof River, historically supported a small, wild run (Figure 7). Too few fish were present to support a viable fishery; total wild returns to this stream were estimated at several hundred fish. To provide additional recreational opportunity, a steelhead enhancement program was initiated here in the early 1980s.

The first return of enhanced steelhead to Crooked Creek occurred late fall, 1986. Observation indicated these fish did not immediately enter Crooked Creek, but overwintered in the Kasilof River. Observation further indicated a very small fall harvest with additional fish being harvested in early spring prior to their spawning migration into Crooked Creek. A total of 142 fish returned to the hatchery in spring of 1987 and 228 in 1988. Harvest as determined by Statewide Harvest Study was 92 in 1986, 185 in 1987 and 36 in 1988. Although harvest is relatively small, the fishery is important to recreational anglers in that: (1) it is the only stream where the retention of steelhead is permitted on the Peninsula; (2) it is one of the few areas anglers can fish for trout in a stream in early spring.

1989 Season

In spring, 1989, 420 enhanced steelhead returned to the Crooked Creek hatchery. The 1989 spring and fall fishery harvested 48 fish.

1990 Season

In spring 1990, 236 steelhead returned to the Crooked Creek hatchery. Of this total, 204 were passed upstream to spawn naturally and 32 were utilized for brood stock. As harvest estimates for both steelhead and coho salmon fisheries are derived from the Statewide Harvest Study, harvests for these fisheries will not be available until fall, 1991.

Management Considerations

As this fishery is supported by enhanced stocks, no in-season management has occurred to date or is anticipated.

Crooked Creek is at the extreme northern limit of this species range in Cook Inlet. This is the reason for low and variable wild stock production from this drainage. Although all fish not required for brood stock are allowed to spawn naturally upstream from the hatchery, minimal production is anticipated. The return of repeat spawning fish from natural spawning will therefore be insignificant and steelhead of Crooked Creek origin will be of a relatively small size (less than 8 pounds).

Restrictions to the fishery which will increase numbers of naturally spawning fish to produce larger, repeat spawning fish are therefore not warranted. Maximum utilization to this resource can however be realized by liberalizing the fishery, permitting a harvest of virtually all steelhead not required by the hatchery.

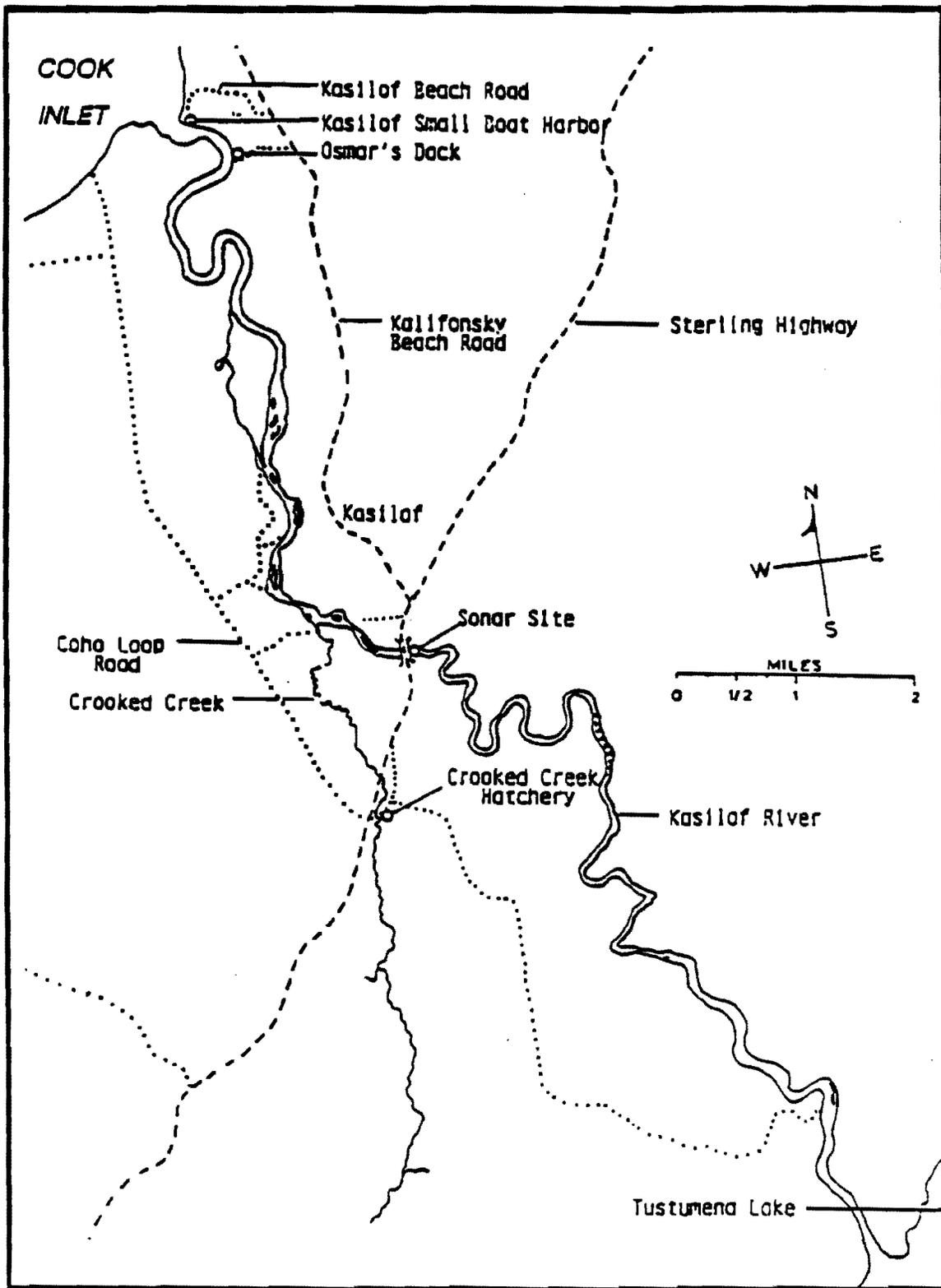


Figure 7. Kasilof River king salmon fishery.

LOWER PENINSULA STEELHEAD TROUT RECREATIONAL FISHERY

Background

The southern Kenai Peninsula steelhead trout sport fishery occurs on Anchor River, Deep Creek, Stariski Creek and Ninilchik River (Figure 22). These are roadside streams which are transected by the Sterling Highway in their lower reaches. The Anchor River receives the most sport fishing effort and has supported an average harvest (from 1978-1988) of 500 fish (Table 30). Deep Creek is the next most popular stream with an average (1977-1988) harvest of 160, followed by the Ninilchik River (average harvest, 120) and Stariski Creek (average harvest, 90).

Regulations governing this fishery have become increasingly restrictive. In 1977 the bag and possession limit was two steelhead trout daily. The season was closed from May 1 to June 30. By 1984 the bag and possession limit had been reduced to one fish daily, a seasonal limit of two fish was imposed and a harvest record required. The season has gradually been reduced and beginning in 1984 fishing was permitted only from July 1 through December 31. From 1984 through 1988 bait was prohibited after September 15. On October 7, 1988 the Anchor River steelhead trout fishery was closed by emergency order for stock conservation.

The southern Peninsula streams support only a fall run of steelhead trout. The fall run begins to enter the river in mid-August with the peak occurring in late September. Available data suggests the run is essentially over by mid-November.

During the years that retention of steelhead trout was permitted (prior to 1989), anglers gradually adopted a voluntary catch-and-release philosophy. In 1978, creel census data revealed 65% of the fish landed were retained. Retention continued to be voluntarily reduced in subsequent years. In 1984 it was estimated that 38.4% of rainbow/steelhead trout were retained; in 1986, 40%; 1987, 23% and in 1988 prior to the emergency closure, the retention rate was 29%. Although the Department does not have data on the

retention rate in the other streams, it is assumed the retention rate on these streams mirrors the trend on Anchor River.

Southern Peninsula steelhead trout have been investigated by resource management agencies since the 1950s (Table 31). Research has focused on Anchor River since this stream has been most popular with the recreational angler and was assumed to support the largest trout population.

The United States Fish and Wildlife Service (USFWS) operated a weir on Anchor River in 1954 and 1957. The weir was located 1.25 miles upstream from Cook Inlet in 1954; in the north and south forks in 1957. Weir counts for these years are incomplete because high water rendered the weir inoperable during certain times. Also, it is not known if a segment of the population overwintered below the 1957 weir sites. The USFWS also conducted a creel census of the steelhead trout fishery in 1954 and 1957.

In 1960 the Sport Fish Division of the Alaska Department of Fish and Game conducted its first creel census of the steelhead trout fishery on Anchor River. This census program was again conducted in 1968, 1978-1985, and 1987-1989. Population estimates of steelhead trout were made through tag-and-recapture programs in 1978, 1980, 1983 and 1984. In 1988 and 1989 the population was estimated by weir, located approximately 1-mile from the mouth of Anchor River.

Harvest estimates for Alaska's fisheries have been generated by a Statewide Harvest Study since 1977. On the southern Kenai Peninsula, estimates from this study have been used to determine annual steelhead harvests from 1977-1988 on Stariski Creek, Ninilchik River and Deep Creek. At Anchor River, on-site creel censuses provide the most accurate data. Creel census data have therefore been used for all years except 1977 and 1986 when no census was conducted. In these years data from the Statewide Harvest Study provided the harvest estimate.

In 1987 the Sport Fish Division began a formal study of Anchor River Dolly Varden. The study was initiated in response to dramatic declines in the

annual returns of this species to Anchor River. A weir was constructed and installed in conjunction with this research investigation. Primary purpose of the weir was to enumerate and capture Dolly Varden. Enumeration of other species to include steelhead during the period the weir was operational was a secondary benefit derived from this structure.

The weir was installed July 4, 1987. It was removed September 11. As the steelhead migration begins in late August and continues through October, a population estimate was not obtained that year. In 1988 the weir was operational July 5 and was removed October 14. High water during the fall rendered the structure inoperable. By extrapolating for the period the weir was inoperable and adding this number to the harvest determined by creel survey, the 1988 Anchor River population was estimated to be about 1,200 steelhead. As prior data indicated the population had declined from an estimated 4,100 in 1978, and in that the creel survey indicated that more than 50% of the Anchor River steelhead trout were handled by sport fishermen, the steelhead fishery was closed for stock conservation October 7.

In 1981 a program was initiated to determine the feasibility of enhancing the steelhead trout returns to the Anchor River. Following the first successful egg take in 1981, 19 males and 25 females were taken in 1982. In 1983, 1984 and 1985 the number was reduced to ten of each sex. In 1986 eggs were taken from 10 males and 13 females. There was no egg take in 1987 or 1988. Incubation and rearing to smolt occurred in southcentral Alaska's Division of Fisheries Rehabilitation Enhancement and Development (FRED) hatcheries. No fish were returned to the Anchor River from the hatchery and the program has been discontinued.

1988 Board Action

The Sport Fish Division staff presented to the Board data which indicated that the lower streams' (specifically Anchor River) rainbow/steelhead trout populations were at low levels. As it was determined that this stock required additional protection the Board:

1. Closed Anchor River, Deep Creek, Ninilchik River and Stariski Creek to the taking of rainbow/steelhead trout.
2. Permitted a catch-and-release only fishery for this species.
3. Prohibited the use of bait in the Lower Peninsula streams after August 15. Bait was prohibited while steelhead were present as fish caught with bait are more prone to injury than fish caught without bait.

The above regulatory measures were deemed adequate to protect the resource while allowing a restrictive catch-and-release fishery to occur.

1989 Season

In 1989, the weir was again inoperable during periods of high water. It remained in place through November 8, the latest date that a weir has been a barrier to fish passage. In 1989, 757 trout migrated through the weir. With allowances for those fish which migrated past the weir when it was inoperable, staff observations indicate the 1989 population approximated the 1988 estimate, i.e. about 1,200 trout.

Only catch-and-release fishing for this species was permitted in 1989; there was no recreational harvest. The creel survey estimated anglers caught 764 steelhead. Assuming a population of 1,200, handling rate was about 64%. Catch rate was 0.037, the lowest catch rate recorded since the current creel survey began in 1987 (Table 32).

1990 Season

Anchor River weir was removed August 15; no attempt was made to enumerate or estimate this stream's population of steelhead. A creel survey designed to estimate the Anchor River Dolly Varden harvest terminated August 15. A monitoring program to assess the relative status of the steelhead fishery continued through early October. The monitoring program also included a

subjective evaluation of the Ninilchik River and Deep Creek steelhead fisheries.

The monitoring program indicated anglers on the three streams targeted coho salmon through early September. In early September, fall rains raised the water levels in these lower streams, reducing angler efficiency. The latter part of the coho salmon fishery was therefore "lost" because of unfavorable stream conditions as was most of the September steelhead fishery. Angler participation in the September fishery was reduced compared to prior years and the monitoring program indicated few steelhead were caught and released.

Management Considerations

Available data indicate the steelhead trout population in Anchor River has declined. Populations in the other three streams have also declined. At this time reasons for the decline are not definitely known. Possible reasons are: (1) an over-harvest of this species in the late 1970s; (2) either short or long term freshwater environmental changes, possibly associated with flooding of Lower Peninsula streams; (3) changes in the marine environment; (4) a combination of the above.

The stocks, however, have not declined to a point where enhancement through the addition of hatchery-reared smolts is necessary to retain the biological integrity or reproductive potential of the population. Most steelhead trout are 6-year fish. It therefore will be at least 6 years before the affects of the current conservative wild stock management (catch-and-release) can be evaluated. Users of this sport fishing resource, however, have philosophical differences regarding appropriate remedial action to address declining steelhead trout stocks. Some individuals and organized groups favor the present conservative wild stock management with no enhancement. In general, catch-and-release fishing is not viewed unfavorably by this group. At the opposite end of the philosophical spectrum are individuals and groups who favor increasing the numbers of fish available to the recreational angler through enhancement. The controversy regarding enhancement as opposed to wild stock management has focused on the most popular stream, Anchor River.

There was therefore a need to develop a management plan for the steelhead trout resources of the southern Peninsula. Norval Netsch, Director of the Sport Fish Division, selected eight groups concerned with the management of this resource to aid in the planning process. Each organization selected one representative to serve on a planning team. The objective of this Steelhead Trout Planning Team was to review available information and recommend management options and objectives for the Department's consideration and action. The Planning Team held five meetings in the winter of 1989-1990.

The Planning Team recommended the Anchor River and the three other Lower Kenai Peninsula streams continue to be managed to maintain a wild steelhead fishery. To achieve this, the fishery should continue to be managed as a catch-and-release fishery in the immediate future. Stocking should not occur unless stocks decline to a point where natural recovery is unlikely. In the Anchor River the Team recommended stocking be initiated only if the actual counts of steelhead through the weir declined to less than 500 fish or the total estimated escapement is less than 700. The goal of a stocking program, if initiated, would be to produce a return of 2,000-3,000 steelhead to this drainage. The Planning Team further recommended that when the estimated Anchor River population reaches 2,500, either through stocking or an increase in wild stocks, that a harvest be allowed.

The Planning Team also considered the use of bait during the coho and steelhead fishery. It was noted that prohibiting bait during the coho salmon fishery reduced the efficiency of anglers targeting this species. Data presented by the Department to the Team indicated about 64.0% of the coho salmon had passed Anchor River weir by September 1, 96.3% by September 15. On average, only 21.4% of the steelhead pass the weir by September 1; 49.7% by September 15 (Figures 23; 24).

Regulation of the fishery prior to 1989 permitted bait to be used in these lower streams through September 15. Regulation in 1989 and 1990 permitted bait through August 14. It was the Planning Team's recommendation, following an extensive review of available data, that the steelhead trout resource

could still be afforded the required protection and angler satisfaction/efficiency increased in the coho fishery if bait were permitted in the lower streams through August 31. If bait were permitted through this date, only 21.4% of the steelhead run would be subject to capture by bait. Anglers would be afforded the opportunity to fish the peak of the coho run (August 15-31) with bait. The Planning Team has submitted a proposal for the Board's consideration which permits the use of bait through August 31.

The Department concurs with the recommendations of the Kenai Peninsula Steelhead Planning Team. The recommendations of this Team are in keeping with the Sport Fish Division's twofold mission of managing wild stocks on a sustained yield basis while maintaining a diversity of recreational opportunity.

As noted, Lower Peninsula steelhead are primarily 6-year fish. The result of the present conservative wild stock management will not be known until 1994. The Sport Fish Division therefore anticipates little change in stock status prior to that date. However, recognizing that the population could fluctuate, the weir will again be employed in 1992 to enumerate this species.

Table 30. Recreational harvest estimates¹ of steelhead trout in four lower Kenai Peninsula streams, 1977-1989.

Year	Creel Survey	Statewide Harvest Study				
	Anchor River	Anchor River	Stariski Creek	Ninilchik River	Deep Creek	Total Harvest
1977		1,070	120	60	270	1,520
1978	1,460	1,750	260	90	370	2,470
1979	610	780	120	130	150	1,180
1980	830	840	80	290	140	1,350
1981	570	780	90	300	140	1,310
1982	370	550	60	130	190	930
1983	430	1,100	40	130	130	1,400
1984	300	760	140	90	220	1,210
1985	180	420	50	50	80	600
1986		380	30	80	80	570
1987	180	460	60	90	30	640
1988	100	160	20	50	90	320
Mean	500	750	90	120	160	1,120
1989 ²	760		0	490	200	690

¹ Estimates rounded to nearest ten.

² In 1989 and succeeding years this fishery was restricted to catch-and-release only. Data reflects fish caught and released. There was no harvest.

Table 31. Historical summary of the Anchor River rainbow/steelhead trout data base, 1954-1989.

Year	Period Covered in Census	Effort (Man-Days)	Steelhead Estimates		Source of Data
			Harvest	Total Run	
1954	5/29-10/23	3,000	247	511	Allin (1954)
1957	5/01-10/15	5,800	50	600	Allin (1957)
1960	5/07-10/02	5,300	400		Dunn (1961)
1968	7/06-10/19	3,045	102		McHenry (1969)
1977	Entire Year	31,515	1,027		Mills (1979)
1978	Entire Year	42,761	1,754		Mills (1980)
				4,132	Wallis & Hamm- arstrom (1979)
1979	Entire Year	44,220	782		Mills (1981a)
1980	Entire Year	33,272	841		Mills (1981b);
				2,388	Wallis & Balland (1982)
1981	Entire Year	34,257	777		Mills (1982)
1982	Entire Year	24,709	551		Mills (1983);
					Wallis & Balland (1984)
1983	Entire Year	28,881	1,101		Mills (1984)
	8/14-10/30	23,823	433		Wallis & Hamm- arstrom (1984)
1984	Entire Season		761		Mills (1985)
	May-June		50		Est. Balland (1985)
	8/13-11/4	7,610	305		Balland (1985)
	Total		355	1,361	Balland (1985)
1985	Entire Season		420		Mills (1986)
1986	Entire Season		380		Mills (1987)
1987	Entire Season		460		Mills (1988)
	7/1-10/31	29,924	181		Larson & Balland (1988)
1988	Entire Season	24,356	164		Mills (1989)
	7/1-11/13	20,234	102		Larson & Balland (1988)
	7/3-10/5			878	Weir Count
	7/1-11/13			1,200	Est. Larson & Balland (1988)
1989	Entire Season	19,145			Mills (1990)
	7/1-11/6			769	Weir Count
	7/1-11/15			1,200	Est. Larson (1989)

Table 32. Rainbow/steelhead trout fisheries data, Anchor River, 1987 - 1990.

Year	Percent of Return Handled	Harvest	Catch	Harvest/ Hour	Catch/ Hour	Estimated Population
1987	71	415	924	0.0176	0.0391	1,300
1988	75	102	904	0.0052	0.0462	1,200
1989	64		764		0.0370	1,200
1990 ¹						

¹ Data not yet available.

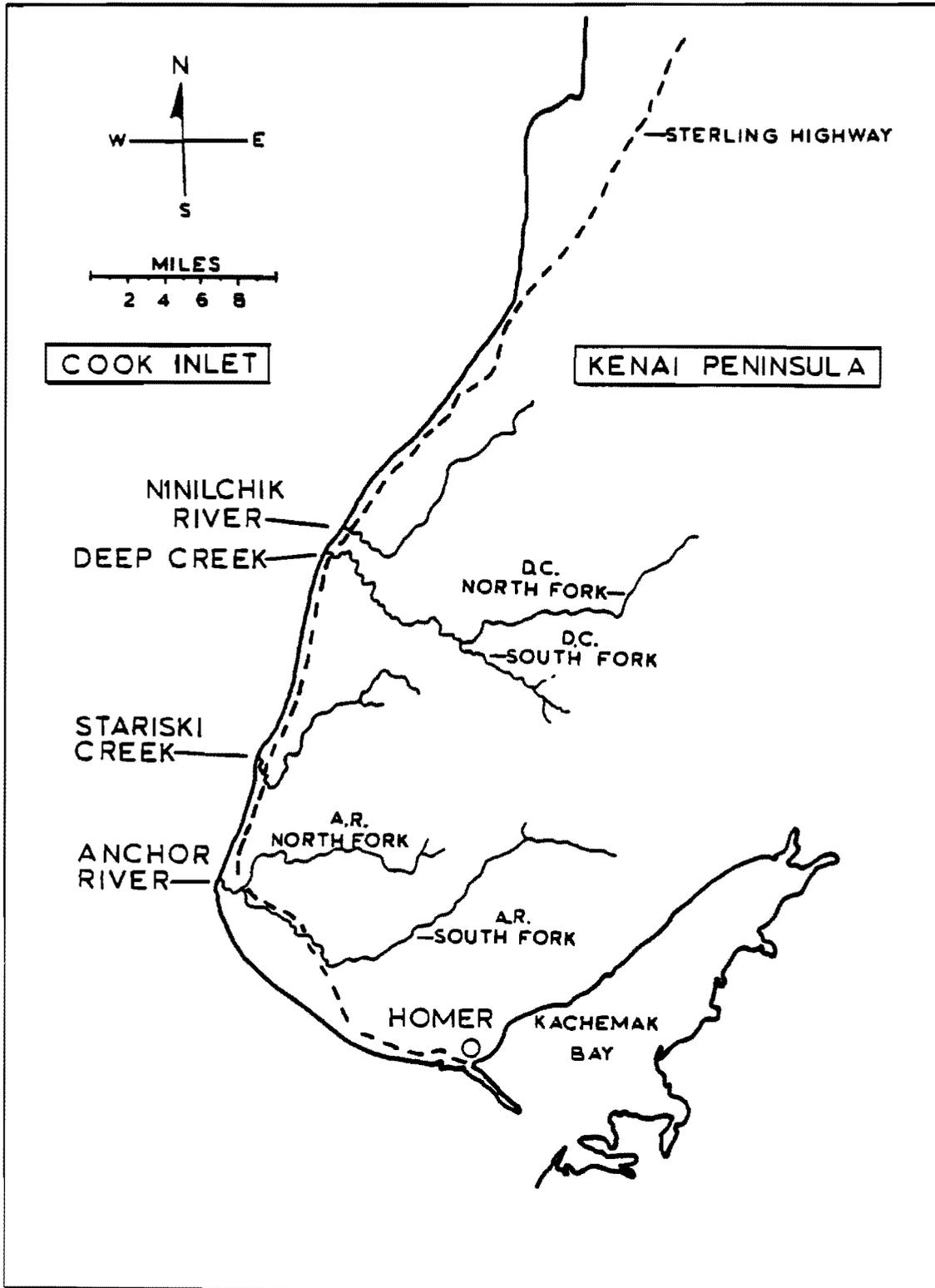


Figure 22. Lower Kenai Peninsula steelhead trout streams.

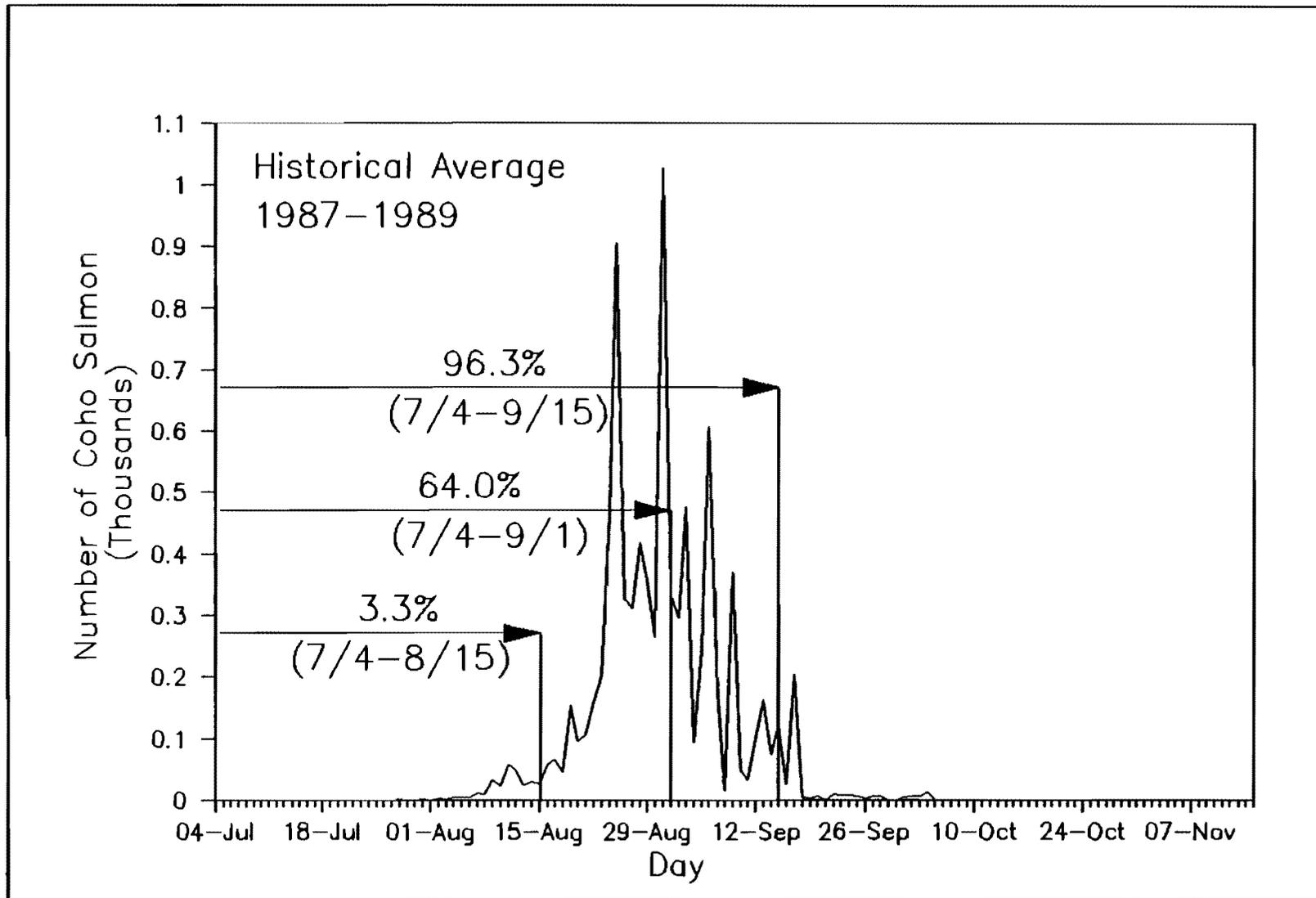


Figure 23. Historical run timing of coho salmon passing upstream through the Anchor River weir (river mile 1.0), by day.

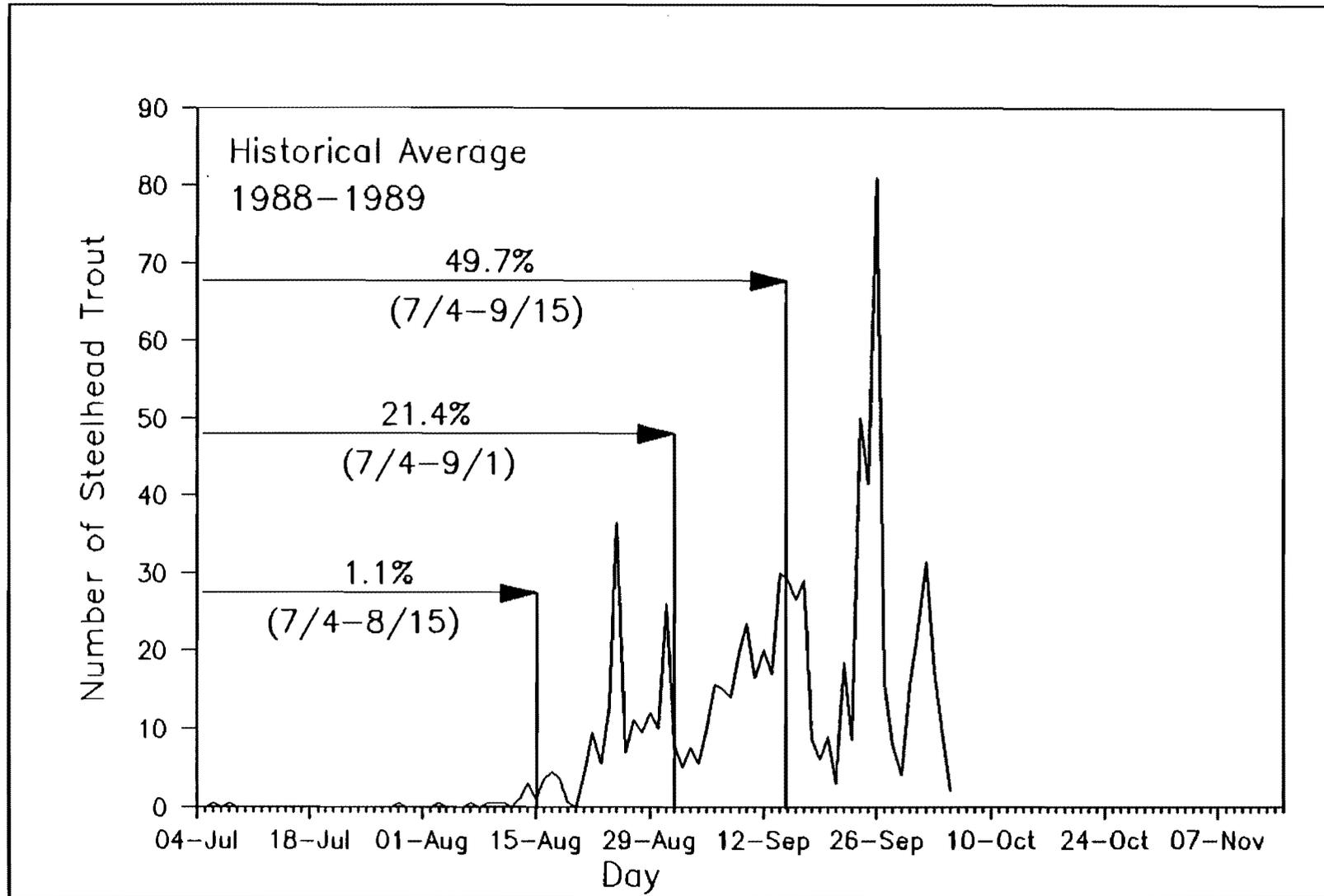


Figure 24. Historical run timing of steelhead trout passing upstream through the Anchor River weir (river mile 1.0), by day.

KENAI PENINSULA RAZOR CLAM RECREATIONAL FISHERY

Background

The Kenai Peninsula razor clam sport fishery is confined primarily to a 50 mile linear area on the east side of Cook Inlet between the Kasilof River on the north and the Anchor River to the south (Figure 25).

Current regulations provide for no closed season, a daily bag limit of the first 60 clams dug and no possession limit. These regulations are further supplemented by natural restrictions. Although there is no closed season, winter weather conditions preclude digging from October through February. Razor clams may be dug on any minus tide, however, tides lower than -2.0 feet on the northern beaches and -3.0 on the southern beaches are preferred. On the northern beaches these tides occur about 65 days annually while on the more southern beaches the average number of days this species is available to the sport digger declines to about 35.

Stock status on these beaches is determined by an annual sampling program on six beach areas and a creel census conducted at the beaches of Clam Gulch and Ninilchik. The sampling program provides the Department with age class composition data, the mean length of clams available to the sport digger, as well as determining spawning success and recruitment of younger age classes to the fishery. The creel census also provides harvest-per-unit-effort data. An estimate of total harvest is obtained from the Statewide Harvest Study.

In 1988 a major research project was directed toward this resource. The research was contracted to the University of Alaska, Juneau. The field work was performed by a graduate student and assistants. Research was designed to provide an estimate of the razor clam density on selected east-side Kenai Peninsula beaches. This was a 3-year program with results available in 1991.

1988 Board Action

Razor clams had previously been regulated as a personal use fishery. Prior legislative action designated all personal use fisheries as providing for the personal consumptive needs of Alaska residents. Subsequent action by the Board of Fisheries designated personal use finfish fisheries for the exclusive use of Alaska Residents; personal use shellfish fisheries provided for participation of both Alaska residents and non-residents. Board action relating to personal use shellfish fisheries therefore was not in conformance with legislative action.

At its spring, 1990 meeting the Board adopted sport fishing regulations for Kenai Peninsula razor clams and other shellfish. Personal use regulations for these fisheries remained in affect. Residents could therefore harvest shellfish under either personal use or sport regulations; non-residents could participate under sport regulations. The sport and personal use regulations for razor clams and other Kenai Peninsula shellfish were identical. Bag and possession limits for personal use are not in addition to sport bag limits; sport bag limits are not in addition to personal use bag limits.

This regulatory change was administrative. Prosecution of the fishery did not change. Residents and non-residents may now lawfully participate in this fishery.

1989 Season

A creel census was conducted at Clam Gulch and Ninilchik in conjunction with the research program. Harvest per digger at Clam Gulch was 25.9; at Ninilchik, 22.5. These harvest rates are below historical averages for these beaches (Table 33).

Prior to 1989 the creel clerk contacted diggers as they left the beach. If the digger did not know the number of clams dug, the census clerk visually estimated the digger's harvest. In 1989 the census was confined primarily to interviewing diggers in the campground. Presumably, these diggers had

enumerated their clams. This method tended to weigh the sample in favor of those diggers remaining in the campground, reducing contact with local residents who left the area immediately after exiting the beach. Observation suggests local residents are more efficient than non-local diggers. Harvest rate in 1989 is therefore not directly comparable to prior years data.

Harvest was estimated at 832,155 razor clams; participation at 22,658 digger days. Both harvest and participation approximate historical averages, but are below levels of recent years. Reasons for a decline in the number of diggers utilizing this fishery in 1989 are not known.

Eleven aerial surveys were flown to determine digger distribution (Table 34). The trend continues to be increased utilization of southern as opposed to northern beaches with over 46% of all effort occurring at Ninilchik Beach.

1990 Season

A creel survey was conducted at Clam Gulch as in prior years. Harvest per digger was 37.5 razor clams. This is above the historical average and one of the highest success rates recorded in this fishery. Two creel surveys were conducted at Ninilchik beach. Success rate was 13.2 clams/digger/trip. Although this is one of the lowest success rates recorded, the data are derived from only two surveys which may not be representative of the seasonal success rate.

Aerial surveys were again flown to determine digger distribution (Table 34). Distribution was unchanged from recent years with over 50% of the diggers utilizing the southern beaches of Ninilchik, Happy Valley and Whiskey Gulch.

This season's harvest and participation will be determined from the Statewide Harvest Study with data available in September, 1991.

Management Considerations

Since 1980 the Department sampling program has indicated recruitment on all beaches to be at high levels. Although recruitment of younger age classes to the fishery does reduce average size of clams available, it also indicates the stocks are maintaining themselves at a stable level. Digger distribution is now more wide spread than it was during the 1970s when Clam Gulch was the focal point of the fishery. Digger emphasis now occurs at the more southern beaches of Ninilchik and Deep Creek.

There are no biological concerns regarding this fishery. Social concern is limited to access to the beaches. At this time, public access is located at Cohoe, Clam Gulch, Ninilchik, and Deep Creek. Despite the increased use of four-wheel drive and other all terrain vehicles, diggers tend to concentrate around access points. Additional access points would more evenly distribute digger effort. This would reduce congestion and provide access to razor clam beaches which presently receive minimal usage. Additional access would therefore benefit both the user group and the resource as harvest would occur over a larger area, reducing impact to the population near access points.

Table 33. Razor clam harvest, participation and success rates on all east side Kenai Peninsula beaches, 1969-1990.¹

Year	Clams/Digger		Participation (Digger-Days)	Harvest
	Clam Gulch	Ninilchik		
1969	31.3		12,200	375,800
1970	29.6		11,370	314,650
1971	29.5		6,800	187,760
1972	34.1		15,400	437,530
1973	36.1		23,770	682,600
1974	34.6		27,410	872,450
1975	38.1		24,260	896,080
1976	35.0		29,320	939,000
1977	34.8		25,390	871,200
1978	30.0		29,750	896,700
1979	29.2		30,320	996,700
1980	26.6		31,490	771,600
1981	28.9		31,300	829,400
1982	30.1		31,950	964,000
1983	31.2		31,470	978,720
1984	34.9		29,880	1,044,300
1985	34.3		31,200	1,068,340
1986	34.8		32,500	1,124,730
1987	38.3	33.4	25,427	979,020
1988	32.4	30.4	30,905	1,171,308
1989	25.9	22.5	22,658	832,155
Mean	32.4	28.8	25,470	820,670
1990	37.5	13.2 ²	³	³

¹ Clams per digger reflects harvest rates as determined by on site creel survey on specific beaches. Harvest and effort are determined by Statewide Harvest Survey and include the beach area between Kasilof and Anchor Point.

² Success rate based on only two surveys.

³ Determined by Statewide Harvest Survey. Results not available until 1991.

Table 34. Distribution, by percent, of east side beach Kenai Peninsula recreational razor clam diggers as determined by aerial survey, 1971 - 1990.¹

Year	No. of surveys	Beach Area					
		Cohoe	Clam Gulch	Oil Pad	Ninilchik	Happy Valley	Whiskey Gulch
1971	2	1.2	52.3	7.6	10.7	22.6	5.6
1972	2	5.7	46.6	3.6	13.2	23.5	7.5
1973	2	10.3	36.8	5.7	16.1	25.1	6.0
1974	2	6.9	54.0	12.6	4.5	16.7	5.3
1975	3	9.8	56.9	11.2	7.9	12.4	1.8
1976	3	7.1	59.4	10.9	9.0	11.0	2.7
1977	3	4.1	66.1	10.5	10.7	5.8	2.8
1978	9	3.3	69.9	9.6	6.5	8.1	2.6
1979	8	4.6	71.4	6.8	6.9	8.8	1.5
1980	9	3.5	57.0	13.2	8.4	14.1	3.8
1981	9	2.9	52.9	11.1	9.6	17.7	5.9
1982	6	1.9	39.4	8.7	10.9	29.2	9.9
1983	6	2.8	39.4	10.4	12.8	24.4	10.2
1984	6	1.1	36.8	15.0	20.5	19.0	7.7
1985	5	1.5	30.2	15.1	26.9	21.8	4.6
1986	4	0.5	27.9	15.0	26.4	21.5	8.7
1987	3	0.3	19.0	11.6	45.8	16.7	6.5
1988	3	1.3	22.6	4.2	46.1	19.4	6.4
1989	11	0.4	26.5	11.1	46.4	10.5	5.1
Mean	5	3.6	45.5	10.2	17.9	17.3	5.5
1990	12	0.7	33.0	14.4	40.5	8.7	2.7

¹ Figures presented are mean values. Tides surveyed are randomly selected.

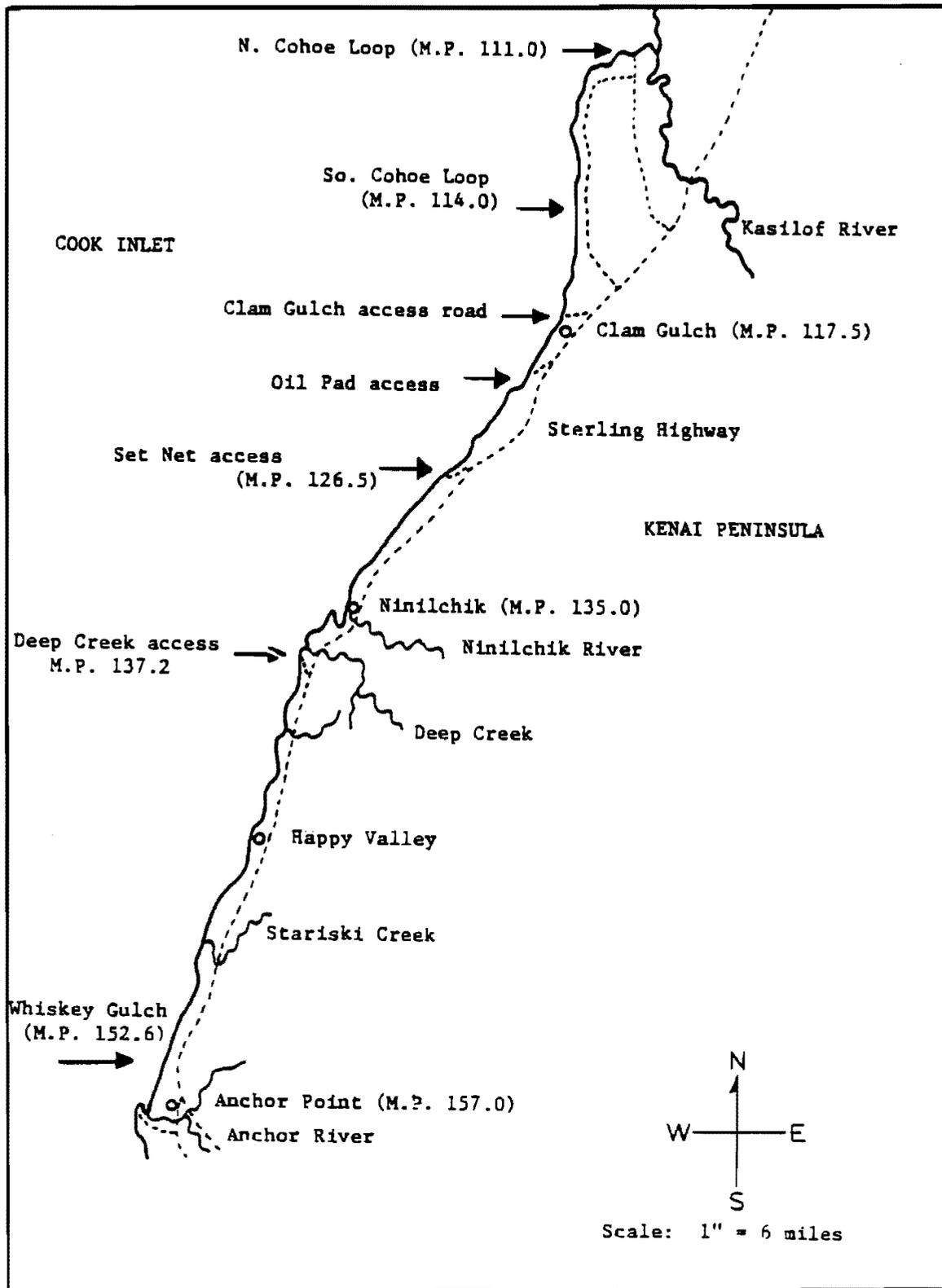


Figure 25. East side Kenai Peninsula razor clam beaches.

SILVER SALMON CREEK COHO SALMON RECREATIONAL FISHERY

Background

Silver Salmon Creek is located on the west side of Cook Inlet approximately midway between Tuxedni and Chinitna Bays. The stream originates in Silver Salmon Lake. Total length of the stream is approximately 1.5 miles (Figure 26). In the intertidal area the stream's maximum width is probably 200 feet. Above the intertidal area width decreases to 30-50 feet. Average depth in this area is 2-3 feet depending on rainfall and seasonal variation.

The stream has been a popular area with some Anchorage and Kenai Peninsula anglers for a number of years. Access to the area is via aircraft which land on the beach. These anglers generally fish the intertidal area of the stream. There are several private residences in the area and one commercial facility, Silver Salmon Creek Lodge. Local residents, in large part, also limit their fishing activity to the lower area of the stream. In the mid-1980s float planes began to land on Silver Salmon Lake. Generally speaking, anglers that arrived via float plane fished the outlet of the lake.

In the spring of 1987, a petition was received from the owner of the Silver Salmon Creek Lodge. The petition was signed by 43 individuals and requested a sport fishing closure above the main channel. Justification for the request was increased sport fishing activity on the spawning grounds and loss of spawning area due to stream rechannelization.

Silver Salmon Creek was observed by Division regional and area staff on May 27. The decision to close the upper one-half mile to salmon fishing was made at that time. Justification was the reduction in spawning area which resulted from stream rechannelization in addition to the increased recreational use of the area. The emergency closure was issued June 8. This closure was supported by the National Park Service which viewed float plane landings on Silver Salmon Lake as disruptive to swans which utilized this area.

The emergency closure precluded fishing at the outlet of the lake. This was the area most heavily fished by those who accessed the area by float plane. Float planes continued to land on the lake. Anglers then walked approximately one-half mile downstream and fished the intertidal area.

The Department had limited data regarding this fishery. The Statewide Harvest Study estimated a harvest of 1,872 coho in 1983; 661 in 1984; no estimate was available in 1985 and a preliminary harvest of 302 was estimated for 1986. This is a minor fishery and the number of anglers responding to the survey was small. At best, the above estimates represent "order of magnitude." Prior to 1987, no spawning escapement surveys were conducted.

Four surveys of Silver Salmon Creek were made in 1987. An aerial and ground survey was conducted September 25. About 50 fish were actively spawning and an estimated 1,000-1,500 fish were still schooled at the outlet of the lake.

In 1988 it was the decision of the staff that Silver Salmon Creek coho salmon be managed in-season based on the number of fish returning to the drainage. The emergency closure which prohibited fishing at the outlet of Silver Salmon Lake downstream for a distance of about one-half mile was not reissued. It was decided that if 500 coho salmon were not observed at the lake outlet by the first week of September with an additional 1,000 coho salmon present by late September, that restrictions to the fishery may be required. The primary user of the lake outlet (Kalgin Island Lodge) and Silver Salmon Creek Lodge, whose clients fish the lower river, were notified via mail of this management strategy.

Four aerial surveys of the stream were again flown. Based on experience acquired in 1987, foot surveys cannot be effectively employed to enumerate salmon in this drainage. All surveys were conducted by experienced observers. The final survey revealed 800-1,200 coho present at the lake outlet.

The staff had routine, informal contact with sport fishermen who utilize this fishery during the 1988 season. The general consensus appeared to be that

the 1988 return was stronger than 1987 and perhaps more numerous than the last several years. Further information provided by the user group indicated increased fishing activity at the outlet of the lake by fishermen accessing the area via float plane.

1988 Board Action

The Board closed the Silver Salmon Creek drainage upstream from the treeline to all salmon fishing. Fishing for other species, primarily Dolly Varden, continued to be permitted throughout the drainage.

This action changed the prosecution of this fishery in 1989 in that those anglers who accessed the area via float plane were no longer able to harvest salmon at the lake outlet. This restriction probably decreased the coho salmon harvest.

The Board's action was expected to reduce, but not eliminate, social concerns relating to this fishery. Anglers who access the area via float plane would still be able to fish non-salmon species at the lake outlet. Anglers fishing the lake outlet would probably catch-and-release coho salmon. Although "targeting" coho salmon is unlawful, enforcement of this regulation is difficult. Confrontations between local residents and those who fish the outlet of the lake were expected to continue to be a social issue.

1989 Season

Social concerns associated with this fishery did not eventuate. Conversations with local residents indicated few float planes landed on Silver Salmon Lake; catch-and-release fishing for coho at the lake outlet did not occur. An aerial survey on August 15 confirmed the content of these conversations as there was minimal disturbance to the lake's emergent aquatic vegetation from aircraft. Angler participation was estimated by Statewide Harvest Study at 1,285 days fished; harvest, 735 coho salmon. Harvest was within the range of prior years' estimates.

High water conditions prevailed on the west side of Cook Inlet in August and September. An aerial survey of August 15 revealed minimal numbers of coho salmon in the intertidal area; no fish were observed at the lake outlet. This was to be expected as large numbers of fish are not present until late August. Weather precluded additional surveys. Conversation with a local resident in late fall indicated a larger coho salmon return than had occurred in the previous 3-4 years. Returns of coho salmon to all west side Cook Inlet streams were above average in 1989. This is partially attributable to the cancellation of the commercial drift fleet fishery due to oil in the middle inlet.

1990 Season

Periodic aerial surveys revealed participation in the fishery was comparable to prior years. High, turbid water in late August and early September precluded a spawning escapement estimate. There were no reports of negative interaction between local residents, anglers that land on the beach and those that access the area via float plane. Contact with local residents indicated a smaller coho salmon return than in 1988-1989. This could be related to fall flooding in 1986 which negatively affected production of west side and some northern Cook Inlet coho salmon streams.

Management Considerations

Action taken by the Board in 1988 addressed the social and biological concerns associated with this fishery. It is anticipated that the fishery will continue to be prosecuted without incident.

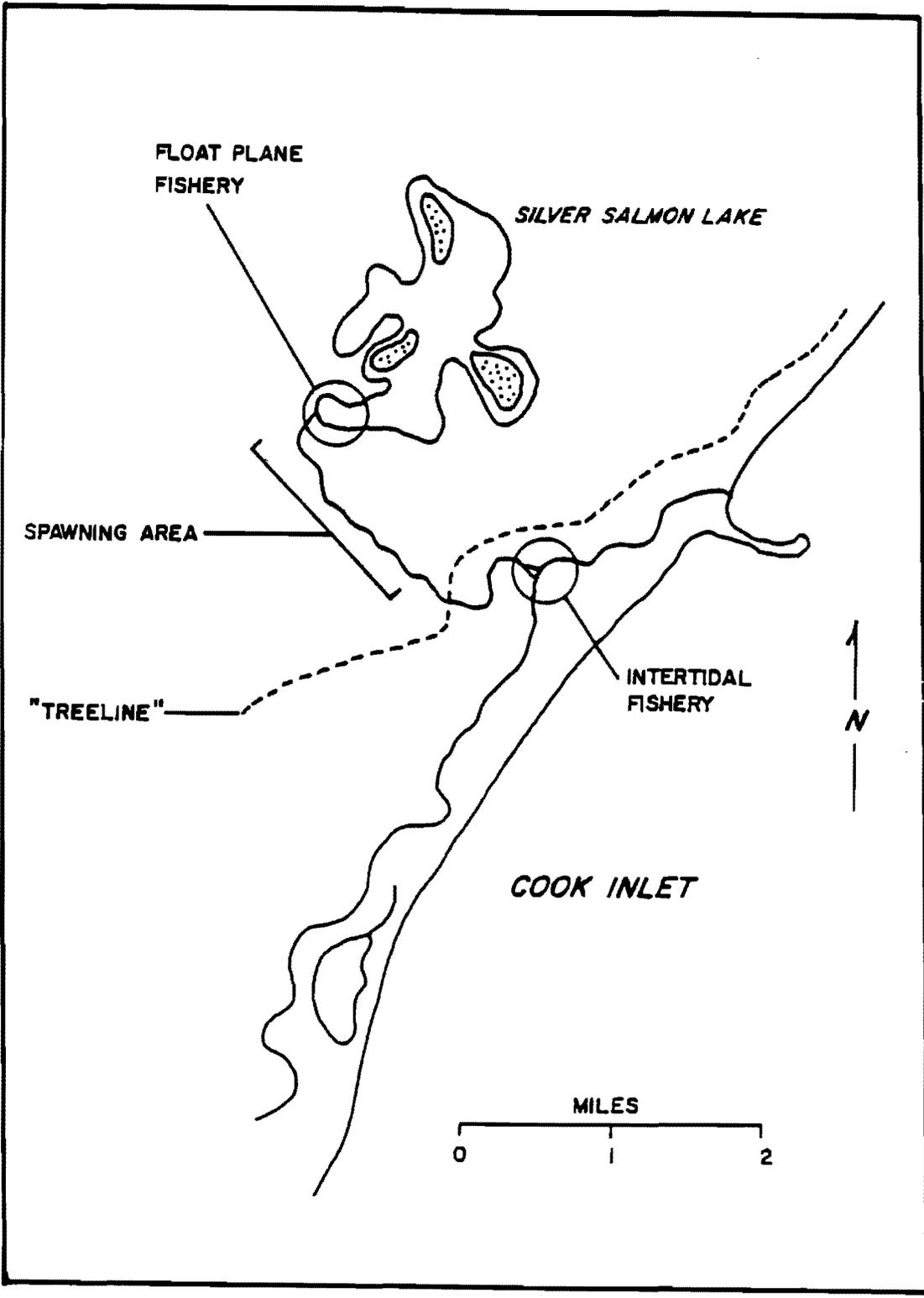


Figure 26. The Silver Salmon Lake drainage.

CRESCENT LAKE RECREATIONAL FISHERY
(West Side Cook Inlet)

Background

Crescent Lake is a large, 3,650 surface acre (about twice the size of Hidden Lake), glacial lake on the west side of Cook Inlet. The lake is drained by Crescent River which enters Cook Inlet immediately north of Tuxedni Bay. Lake elevation is about 600 feet (Figure 27). Lands surrounding the lake are in federal ownership (Lake Clark National Park).

Crescent River supports populations of king, sockeye, coho, pink and chum salmon in addition to anadromous Dolly Varden. Resident lake species are lake trout and Dolly Varden. Rainbow trout are not known to inhabit the drainage.

A recreational fishing lodge is located adjacent to the outlet. The lodge is privately owned and has been on the lake since and probably prior to 1979. The owner of the lodge has expressed concern regarding increased usage of the lake outlet and upper river area by anglers transported to the lake by air taxi operators. He believes increased usage is adversely impacting the Dolly Varden population.

1988 Board Action

There were no regulatory changes affecting this fishery.

1989 Season

The fishery occurs at the lake outlet and for a distance of about 1.5 miles downstream. This section of the river may be fished from boats or rafts. Downstream from this area the stream narrows, forming a rapids. Boats do not travel downstream from the rapids. This 1.5 mile area is smaller in size, but comparable topographically to the outlet of Skilak Lake.

Sockeye salmon were observed at the outlet by Department personnel on August 15. These were mature fish and were not being harvested. "Bright" fish are reportedly available earlier in the season. Spawning sockeye were also observed in small tributaries which constitute the lake's headwaters. Anglers at the lake outlet were targeting Dolly Varden and lake trout.

Management Considerations

Crescent Lake is receiving increasing sport fishing effort. Air taxi operators from Soldotna, Kenai and Anchorage fly clients to the lake. Increased angler participation has increased the harvest of both Dolly Varden and lake trout. The increased harvest is perceived by some members of the angling public as a resource conservation issue. The perceived conservation issue is exacerbated by philosophical differences of user groups. Clients of the lodge reportedly practice catch-and-release fishing; anglers that fly in to the lake are reportedly more harvest oriented.

It is unlikely that there is a resource conservation issue associated with this lake. Given the size of the lake, it is not reasonable to assume the entire lake's population of Dolly Varden and lake trout is being negatively affected. What may be occurring is that there is a decline in abundance of these species in selected areas of the lake outlet over time. Numbers of fish would decline throughout the season, being replaced by fish migrating from the lake the following spring to this preferred area.

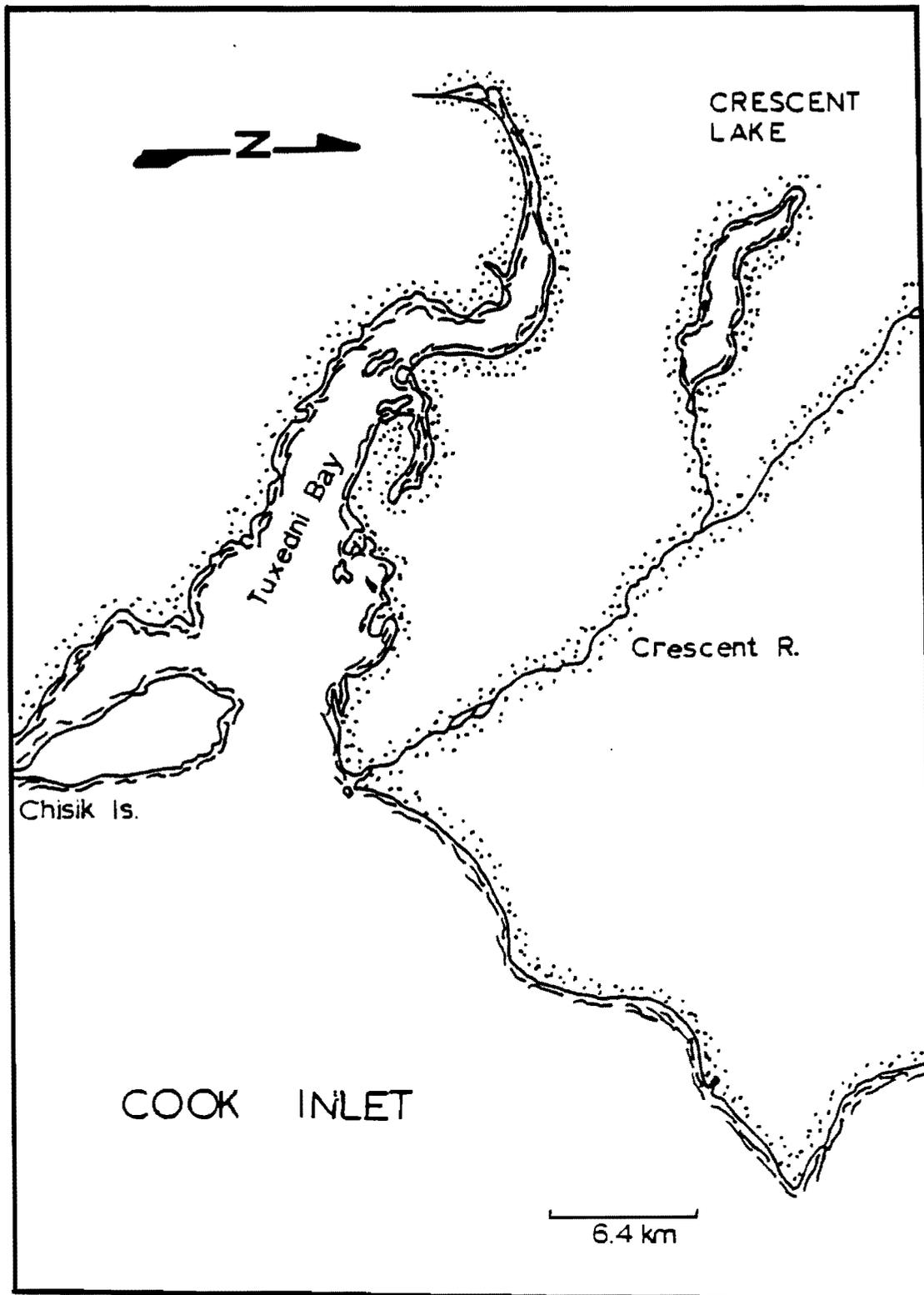


Figure 27. The Crescent Lake drainage.

KENAITZE EDUCATIONAL FISHERY

Background

The 1989 Kenaitze educational fishery resulted from extensive legislation and litigation related to both state and federal interpretation of "subsistence." An abbreviated chronology of events culminating in the educational fishery are:

1. In 1971 the Alaska Native Claims Settlement Act, in exchange for \$962.5 million and 46 million acres, extinguished aboriginal hunting and fishing rights.
2. In 1978 Alaska passed legislation providing for a subsistence priority in allocating fish and game resources.
3. ANILCA was enacted in 1980. This Act provided that "the taking on public lands of fish and wildlife for nonwasteful subsistence uses shall be accorded priority over the taking on such lands of fish and wildlife for other purposes." "Subsistence uses" were defined as "the customary and traditional uses by rural Alaska residents of wild, renewable resources." ANILCA did not define rural.
4. ANILCA provided for the continued state management of fish and wildlife resources on federal lands if the state subsistence law mirrored the subsistence provision of ANILCA.
5. In December, 1980 the Board of Fisheries established ten criteria to identify "customary and traditional uses" of Cook Inlet salmon stocks. In the spring of 1981, the Board applied these criteria to Cook Inlet which virtually eliminated subsistence fishing here. This action lead directly to "Madison vs. Alaska Department of Fish and Game" in 1985.

6. In the spring of 1982 the Joint Boards adopted what became known as the "eight criteria regulation." The eight criteria were modeled after the Cook Inlet ten criteria developed a year earlier by the Board of Fisheries. This joint Board action limited the subsistence priority to "rural Alaska residents."
7. In May, 1982 the Secretary of the Interior certified the state was in compliance with ANILCA.
8. In 1985 the Alaska Supreme Court found the action of the Boards inconsistent with state law (Madison vs. Alaska Department of Fish and Game). This decision held that subsistence uses of fish and game could not be solely for rural residents.
9. Following the "Madison decision" the Secretary of the Interior notified the state that it was no longer in compliance with ANILCA.
10. In 1986 the Alaska Legislature amended the state subsistence statute to limit subsistence to rural residents and provided a definition of "rural." The term was defined as "a community or area of the State in which the noncommercial, customary and traditional use of fish or game for personal or family consumption is a principle characteristic of the economy or of the community or area."
11. With the passage of the 1986 subsistence statute, Alaska was again in compliance with ANILCA.
12. A letter from Assistant Secretary of the Interior, William Horn (November 7, 1986), stated that under the original state subsistence statute (1978) the Kenai Peninsula was a rural area and qualified for the subsistence priority; 1986 state legislation precluded most of the Kenai Peninsula from the definition of rural and hence from the subsistence priority.

13. In 1986 the Kenaitze Tribe in federal district court contended that the state's definition of "rural" in which the noncommercial use of fish or game is a "principle characteristic of the economy" is not consistent with the term "rural" as used by Congress in enacting ANILCA. This tribe argued the Kenai Peninsula was rural.
14. Initially, the U.S. District Court found Alaska's definition of rural consistent with ANILCA and denied the Kenaitze request for a preliminary injunction.
15. In 1989 the Ninth Circuit Court reversed the District Court ruling and held that Alaska's definition of rural was not consistent with "rural" as used in ANILCA. This court held the Kenai Peninsula to be a rural area under ANILCA and remanded the case back to the District Court with instructions to this court to issue a preliminary injunction granting a subsistence fishery to the Kenaitze Tribe.

1989 Season

On May 31, 1989 U.S. District Court Judge Holland approved a consent preliminary injunction authorizing a Kenaitze Tribal Educational Fishery. Terms of the fishery were negotiated between the State and Kenaitze Tribe on May 26. The permit authorizing this fishery stipulated:

1. Members of the tribe domiciled in Game Management Units 7 and 15 could participate.
2. The salmon season was from June 15 through September 14. Hooligan could be taken from October 1 through November 30. All salmon taken during the hooligan season are required to be returned to the water.
3. Fishing was permitted 24 hours daily.

4. Salmon gear was a single set gill net not to exceed 60 feet in length, 6 inches in mesh size and 45 meshes in depth. Smelt gear was one or more nets not to exceed 60 feet in aggregate, two inches in mesh size and 45 meshes in depth. Nets had to be attended at all times.
5. The fishing area was the Kenai River from one-quarter mile upstream from the Warren Ames Bridge, downstream to the mouth (about 5 miles) to include those areas north and south of the river mouth in Cook Inlet normally closed to commercial fishing (this area extends approximately 2 miles to the south and 1.5 miles to the north) (Figure 28).
6. The fishery had a harvest quota of 600 king salmon prior to July 31 and a total quota of 5,000 salmon. If 600 king salmon were harvested prior to July 31, the fishery would close until August 1. Any king salmon caught after August 1 would be considered "salmon" and would be counted against the 5,000 salmon quota.
7. Salmon taken in this fishery had to be marked by removing both lobes of the caudal fin. The fish could not be bartered or sold.
8. The permit had to be maintained at the net site.
9. The harvest had to be reported weekly to the Department office in Soldotna. A seasonal summary was required to be submitted to the Department within 10 days following the close of the season. The summary was to provide the season's harvest and harvest distribution.

The Sport Fish Division provided the Tribe with a form for harvest reporting. Daily harvests were provided the Department whenever such information was requested.

A brief seasonal report was received from the tribe on October 24. Harvest reported was 2,212 sockeye salmon, 95 king salmon and 1,814 coho salmon; total harvest 4,121. Predicated on run timing, approximately 73 king salmon, 114 sockeye salmon and 1,219 coho salmon were early run fish.

The report stated: "Salmon was distributed to 129 families on the Peninsula, plus a number of individual members who reside in other places in the country, and not on the Peninsula. In addition, salmon were distributed to the villages of Ninilchik, Port Graham and English Bay. We also shared with the Kenai Peninsula Community Care Center and the Women's Resource Center, and a few tourists."

1990 Season

A second consent preliminary injunction was agreed to between the State and Kenaitze Tribe on April 11, 1990. This injunction provided for the 1990 educational fishery. Permit stipulations were identical to the 1989 fishery except:

1. The salmon season was May 15 to September 1; September 16 through September 30.
2. Maximum gill net mesh was increased from 6.0 inches to 8.5 inches. If the king salmon quota was achieved, mesh size would then be reduced to 6.0 inches for the remainder of the season.
3. Harvest quota was raised to 6,000 salmon, no more than 600 of which could be king salmon (the king salmon quota was also 600 in 1989).
 - a. If 300 king or 1,000 sockeye were taken prior to July 1, salmon fishing would terminate and not resume until July 1;
 - b. If 600 king salmon were taken prior to August 1, salmon fishing would terminate and resume on August 1.
4. No more than 500 coho salmon could be taken after September 15.

The Sport Fish Division again provided the Tribe with a form for harvest reporting. Daily harvests were provided the Department upon request.

The Kenai River early run king salmon fishery was restricted to catch-and-release fishing from June 7-30. Although not required to do so under terms of the educational permit, the Tribe refrained from fishing from June 5-22.

Preliminary seasonal harvest as reported by the Tribe was:

Early run king salmon	40
Late run king salmon	13
Early run sockeye salmon	19
Late run sockeye salmon	3,458
Early run coho salmon	189
Late run coho salmon	928
Pink salmon	<u>326</u>
Total salmon	4,973

As of this writing, the final seasonal report has not been received.

Management Considerations

This was a court mandated fishery which harvested salmon of Kenai River origin. The harvest of king salmon was minimal in both years and did not affect the inriver sport fishery. The coho salmon harvest was also relatively small in relation to numbers of fish present as was the sockeye salmon harvest.

There was some negative public reaction to this fishery in 1989. Negative public comment was prevalent during the early weeks of the fishery, abating as the season progressed. Comments focused on the exclusion of non-Kenaitze participants in the fishery and the perceived negative affect this fishery would have on the inriver sport fisheries. Visible public dissatisfaction with this fishery was minimal in 1990.

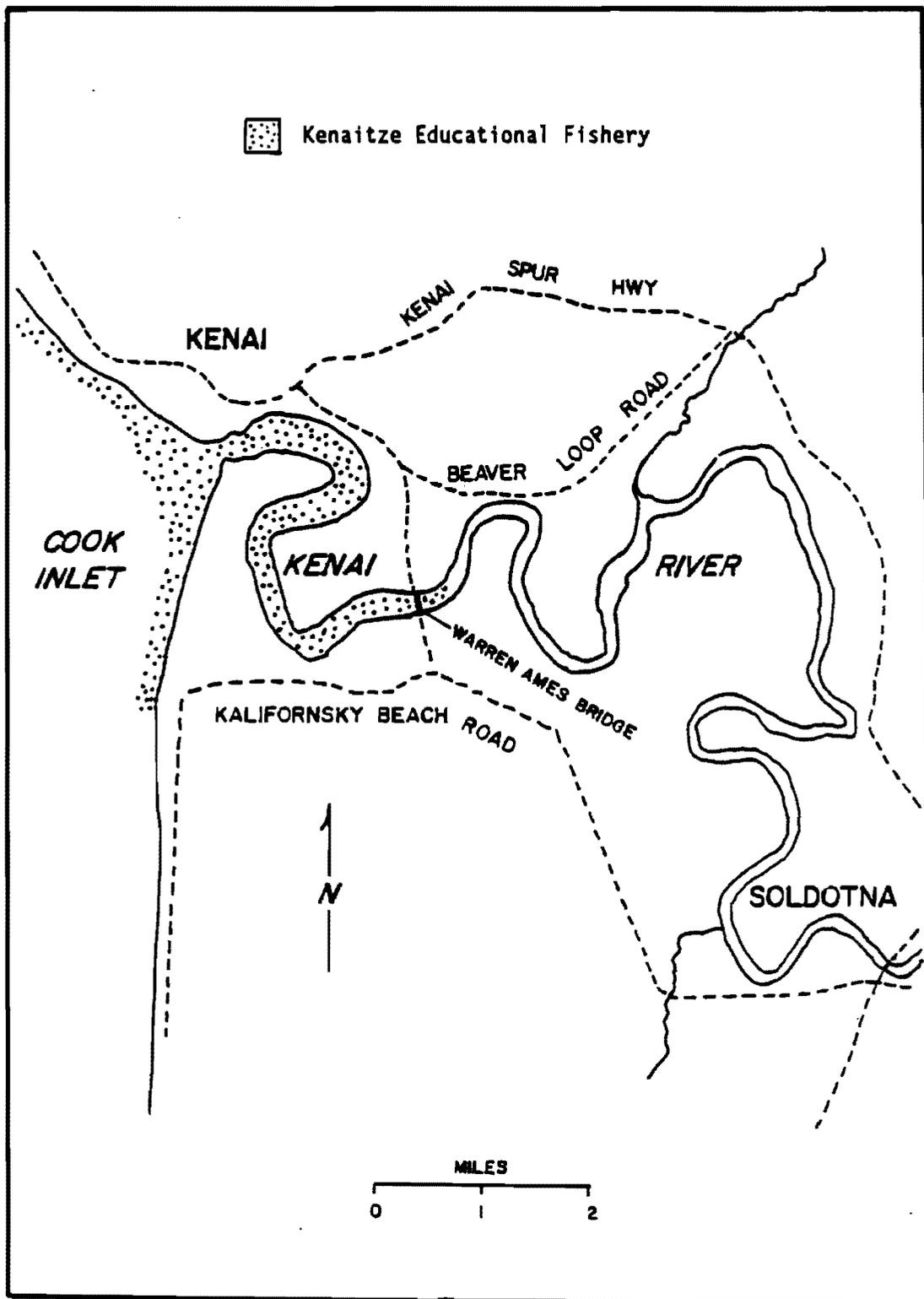


Figure 28. The Kenaitze educational fishery on the Kenai River.

ARLIS
Alaska Resources
Library & Information Services
Anchorage, Alaska
